Edison Environmental & Engineering

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26 October 2015

Re: Response to Agency Comments on Soil and Water Report, The Next Generation, Energy From Waste Plant, Eastern Creek.

Dear Skye,

I have reviewed the relevant comments and have addressed those relevant to the Edison Environmental & Engineering (Edison) report entitled *Assessment of Soil and Water Impacts: Proposed Energy from Waste Facility, Eastern Creek (*E15002-DADI-001) herein.

This letter provides a response to comments from: Environment Protection Authority of New South Wales (EPA NSW with EnRisk and Arup); Blacktown City Council; and Hanson.

1. EPA, EnRisk, ARUP
The seven comments provided by the EPA NSW in relation to the soil and water report are addressed below.

Point 4 Background Concentrations and Groundwater Data

Point 4 EPA letter	Page 16, Section 3.7.1. It is concluded from previous reports (ADI, 1995 & ADI, 1998) that groundwater at the site is not contamination, although the write questions the validity of the analytical results. It is also stated that: "It is further noted that low-levels of TPH and PAH can occur naturally in samples of bedrock in the Wianamatta Group rocks" although a reference to this statement is not provided. Recent site contamination investigations by ADE (2014) have not analysed the groundwater to verify this conclusion. It is advised that the ADI (1995 and !998) reports of relevant extracts be provided for verifications along with a reference that substantiates the claim that natural TPH and PAH levels occur in the bedrock.

Our response to the comment is as follows:

- Our client will provide a copy of the ADI (1995 and 1998) reports;
- In relation to the matter of naturally-occurring background levels of TPH and PAHs in the Wianamatta Group rocks, the author has direct experience in the sampling and analysis of carbonaceous shales freshly excavated from quarry pits in the Sydney basin. This comment was made by way of background.

Point 5 Bio-retention Basins

Point 5 EPA letter	Page 25 mentions bio-retention basin, however, this basin is now being used as a storage/treatment pond of runoff stormwater prior to discharge into a tributary of Ropes Creek. Clarification is required of any water treatment that will be carried out prior to discharge. For example flocculation, etc. If any treatment will be carried out, additional details of the chemicals used (eg, flocculant etc) is required together with an explanation of the dosing system (automatic or manual) to avoid residual chemicals migrating into the creek.

It is understood that the basin is a bio-retention basin and will be used for water treatment to the BCC SEPP 59 standards. This basin will be ultimately dedicated to BCC and is designed to meet the required BCC treatment rates and detain the water flows off site to not exceed pre-developed rates.

Point 6 Surface-water sampling locations

Point 6 EPA letter	Page 26, section 5.2 refers to Table 5.2 for monitoring details. Table 5.2 indicates relevant sampling locations 1 to 7, however, the actual locations of these sampling points are not identified in a location plan. Provide diagrammatic locations of the proposed sampling points.

A description of the monitoring point locations is as follows, as per the IGGC (2015) report:

1: Upstream site boundary;
2: Upstream of construction sediment basin/bio-retention basin discharge point;
3: Downstream of construction sediment basin/bio-retention basin discharge point;
4: Downstream site boundary
5: Construction sediment basin/bio-retention basin;
6: Discharge from construction sediment basin/bio-retention basin;
7: Excavation Sump(s)/Dewatering Wells.

Point 7 Suite A analytes

Point 7 EPA letter	Page 26 refers to one of the Suite A analytes as 'total heavy metals'. Clarification is required as to what this 'analyte' actually represents. It appears that this refers to a total concentration of heavy metals, however, individual heavy metals are not specified.

Clarification is as follows:

- 'Total heavy metals' refers to the determination of concentrations of eight metals and metalloids (arsenic, cadmium (total), chromium, copper, mercury, nickel, lead, zinc) in un-filtered water samples.

Modified page 26 as follows:

The following analytical suites and field measurements are recommended:

- Suite A: Routine Monitoring. Field measurements and observations (pH, electrical conductivity (EC), dissolved oxygen (DO), turbidity and description of flow conditions). Laboratory analysis for total suspended solids (TSS), total (unfiltered) heavy metals, nutrients (ammonia, total oxidised nitrogen (NO¬¬x), total nitrogen (TN) and total phosphorus (TP)), total organic carbon (TOC);
- Suite B: Wet weather monitoring. Field measurements and observations (pH, electrical conductivity (EC), dissolved oxygen (DO), turbidity and description of flow conditions. Ammonia, TN, TP, TOC, TSS;
- Suite C: Field monitoring of surface water conditions during construction. Field measurements and observations (pH, electrical conductivity (EC), dissolved oxygen (DO), turbidity and description of flow conditions with particular attention to visual appearance such as surface sheen, visually turbid, etc), odour and flow conditions.

Point 8 Turbidity

Point 8 EPA letter	Consider adding turbidity field measurement to Suite B and C analytes.

Agree to add field turbidity measurement to Suite B and C. Modified page 26 as follows:

The following analytical suites and field measurements are recommended:

- Suite A: Routine Monitoring. Field measurements and observations (pH, electrical conductivity (EC), dissolved oxygen (DO), turbidity and description of flow conditions). Laboratory analysis for total suspended solids (TSS), total (unfiltered) heavy metals, nutrients (ammonia, total oxidised nitrogen (NO¬¬x), total nitrogen (TN) and total phosphorus (TP)), total organic carbon (TOC);
- Suite B: Wet weather monitoring. Field measurements and observations (pH, electrical conductivity (EC), dissolved oxygen (DO), turbidity and description of flow conditions. Ammonia, TN, TP, TOC, TSS;
- Suite C: Field monitoring of surface water conditions during construction. Field measurements and observations (pH, electrical conductivity (EC), dissolved oxygen (DO), turbidity and description of flow conditions with particular attention to visual appearance such as surface sheen, visually turbid, etc), odour and flow conditions.

Point 9 Monitoring Non-Compliance

Point 9 EPA letter	Additional information is required of the management options available if any of the Table 5.2 monitoring shows non-compliance.

Sections 6.12 and 6.13 of the Brookfield Construction Management Plan address the matters of non-compliances and non-conformances, the latter section relating specifically to environmental audits which are taken to include environmental monitoring results.

2. Blacktown City Council

Blacktown City Council states that "The soil and water assessment is incomplete." The Jacobs report attached to the Council submission contains a series of queries related to the operation of the plant:

a. The overall water consumption is nominated as 25.6 m/h (Concept Design pg 25), but no breakdown is provided. It is assumed that the water treatment plant effluent and the boiler blow down volumes will be consumed by ash quenching. Therefore the wastewater will be disposed with the bottom ash in evaporation and absorption (bottom ash 25% H_2O by weight). The wet bottom ash is proposed to be recycled as aggregate, however water may degrade the value of the aggregate.

   Response: The plant designer, Inova HZI has prepared a water balance for the plant (attached). The water balance provides a detailed account of water use in the plant. The water balance shows the amount of water expected to be use for ash quenching but does not estimate the water content of the quenched ash.

b. Water generated from commissioning e.g. boiler chemical clean at commissioning would be removed from site by truck to a licensed facility. This is reasonable due to the small volumes proposed. We would recommend a boiler maintenance drain tank be added, to allow for reuse of the water following maintenance.

   Response: The plant designer will consider the installation of a boiler maintenance drain tank.

c. No water analysis is provided.

   Response: The HZI water balance provides a detailed account of water use in the plant. The designers have assumed that all input water will be Sydney Water mains supply. Edison Environmental & Engineering have not cited any data on the quality of water in various stages of the plant.

d. No water balance is provided, which is essential to determine how water is used and reused within the plant. The Soil and Water Report Section 7.2 and EIS Section 3.16 deal with water only at a high level for the actual power plant.

   Response: Plant designer Inova HZI prepared the water balance for the plant (attached). The water balance provides a detailed account of water use in the plant.

3. Hanson

Letter	Inadequate Groundwater Impact Assessment. Insufficient detail provided in the EIS on the nature of the waste bunker to adequately assess true impacts on the groundwater system that flows through to Ropes Creek and potential GDEs and IDEs. "The waste bunker, some 15m deep, has the potential to intercept and possibly obstruct

	shallow groundwater flow. As no significant groundwater is expected to be encountered at the proposed excavation depths, the potential impacts are considered to be negligible." Figure 3.6 of this report shows the location of groundwater monitoring bores (piezometers) within the vicinity of the proposed development. Table 3.3 of this report states that the depth measured to ground water at these bores: It is evident that the proposed invert of the waste bunker will be significantly lower than the existing groundwater levels. There is insufficient detail provided in the EIS on the nature of the waste bunker to adequately assess true impacts on the groundwater system that flows through to Ropes Creek and potential GDEs and IDEs. According to the BOM GDE and IDE mapping (below) the area in question is highly likely to have ground water interaction and have GDEs and/or IDEs reliant on surface and subsurface ground water flows. The EIS has made no assessment of the impacts on these GDEs and IDEs.

A cross section of the site showing the current and proposed land surface, intermediate and deep groundwater pressure levels and interpreted shallow groundwater table is attached. The data herein are derived from IGGC (2014). The location of the cross section is shown in the attached plan prepared by AT&L.

It is noted that:

- The existing ground surface at the location of the proposed waste bunker ranges from ~74 to ~78m AHD;
- The level of the base of the waste bunker is ~61 mAHD;
- The interpreted shallow groundwater table at ~68-70 mAHD (IGGC, 2015);
- The completed width of the waste bunker is approximately 32 m.

It is understood that the waste bunker will be fitted with a groundwater drainage and extraction system, presumably comprising drainage material between the excavated bedrock and concrete liner.

It is expected that, over time, the shallow groundwater table will be depressed in the area around the waste bunker. Groundwater inflows are expected to be greatest immediately following completion of the excavation and then progressively decline as water until levels stabilise.

Groundwater Inflow Estimates

Groundwater inflows will consist of lateral inflow through the four walls and upward inflow through the floor. It is noted that these calculations assume the installation of a drainage system in the bunker, that the bunker will drain freely to a collection sump and will not confine or restrict groundwater inflow.

Walls of Bunker

The following model was adopted to calculate groundwater inflow through each wall (four walls) of the bunker:

$$Q = K (dh/dl)\, d\, L$$

Where:

Q = Groundwater inflow rate expressed in $m^3\ day^{-1}$;

K = Saturated hydraulic conductivity ($m\ s^{-1}$). Note that, in the absence of site-specific data, the permeability value reported for BH10D at depth interval 34-40m by IGGC; (2009) was adopted. This value (5×10^{-7} m/s) was adopted in the absence of site-specific hydraulic conductivity data at shallow depth;

dh/dl = Hydraulic gradient. The existing levels were adopted from the IGGC (2014) interpreted shallow groundwater table and the base of the bunker. For example, the gradient was calculated as the difference in the existing interpreted groundwater level at chainage 300 (66 m AHD) and 480 (74 mAHD) and the base level of the bunker (61 m AHD) divided by the distance of these points from the nearest edge of the waste bunker (chainage 368 and 398);

d = Saturated thickness on walls calculated as level difference between the interpolated standing water level and the base of the bunker. It is noted that this approach is expected to overestimate the groundwater inflows as the saturated thickness will reduce over time following the pumping of water from the bunker;

L = length of wall.

Floor of Bunker

The volume of inflow through the base of the bunker (assuming no confinement) can be estimated using equations derived by Haitjema (1992). A schematic diagram showing the relationship of the input parameters is presented in the figure below. The following model was adopted:

$$Q = K ((\Phi d - \Phi l)/\Phi d)\, A$$

Where:

Q = groundwater inflow rate expressed in $m^3\ d^{-1}$;

K = saturated hydraulic conductivity in $m\ s^{-1}$;

Φd = Mean height difference between base of bunker and interpreted shallow groundwater level in the bunker location;

Φl = Design standing water level in void (zero standing water in design);

A = Area of bunker floor.

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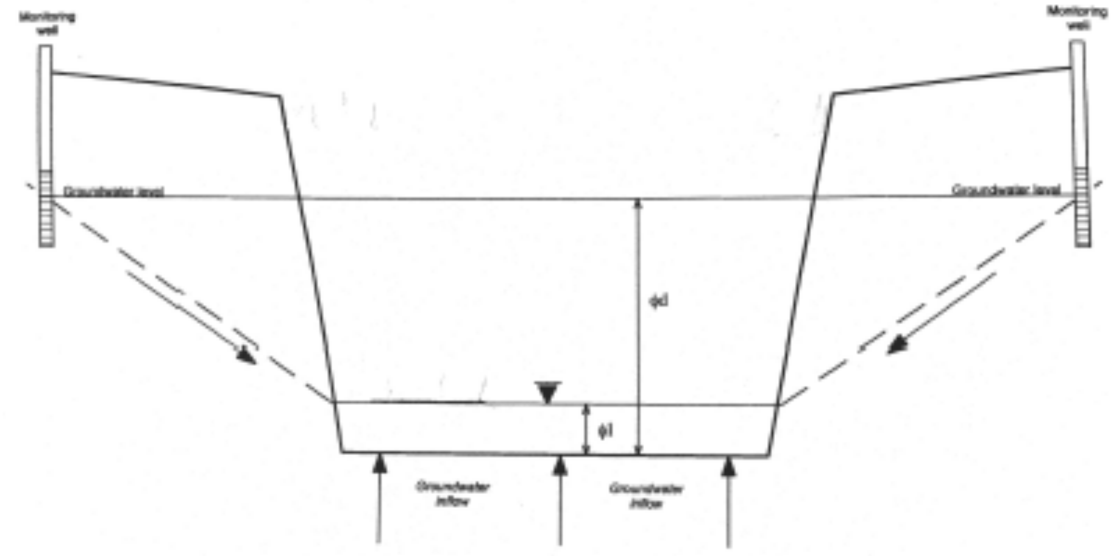

The following input parameter values were adopted.

Values of input parameters for groundwater inflow modelling into bunker					
Parameter	**Units**	**Side walls (2)**	**North wall**	**South wall**	**Floor**
K	m s^{-1}				
d	m	8	9	7	--
l	m	70 (2 at 35m)	110	110	--
Hydraulic gradient (*d*h/*d*l)	--	0.116	0.158	0.074	--
Φd	m	N/A	N/A	N/A	8
Φl	m	N/A	N/A	N/A	0.01
A	m2	N/A	N/A	N/A	3850

Side walls – average saturated thickness and hydraulic gradient of north and south walls
Φd = average north and south wall estimated standing water level
Φl = adopt notional value 0.01

Inflow calculations are attached to this letter. It is noted that the results of modelling are preliminary in nature due to the absence of site-specific hydraulic conductivity data and use of interpreted groundwater levels. Also, the saturated thickness on the walls is also overstated, which would lead to an overestimation of the inflow rates. Nonetheless, the modelling yields an estimate of 32.8 m^3/d of inflow into the bunker (walls and floor combined). It is understood that a drainage system and pump will be built into the bunker to collect and remove groundwater seepage.

In relation to Groundwater Dependent Ecosystems (GDEs), the shallow groundwater system present beneath the site is likely to be providing some support to terrestrial vegetation (predominately non-native grasses) and a limited contribution to base flow in the tributary. The groundwater system is limited to that hosted by the weathered profile overlying the shale bedrock with low hydraulic conductivity likely to prevail except in the upper ~1 m of the soil profile. The available groundwater storage in the system is low; this, together with the low hydraulic conductivity of the lower soil profile and underlying strata greatly limit the potential for the shallow groundwater system to sustain terrestrial ecosystems or surface water base flow during extended dry periods. The limited contribution of shallow groundwater to surface water base flow is supported by the salinity levels noted in monitoring bore MW2.

The site and the tributary of Ropes Creek have been substantially altered from the original natural state by historical clearing of native vegetation to allow establishment of pasture and by maintenance of a highly artificial surface water flow regime over a prolonged period due to discharge of water pumped from the quarry and by leakage from the settlement dams located immediately adjacent to the south-eastern boundary on Hanson's site.

4. Miscellaneous Comments

AQA-Water Assessment by EPA. Point 2.

Point 2	In Table 5, page 55, it is stated under column "Control Measures" row "Soils and Water" that: "If high salinity soils are encountered, these soils will be removed for covered storage and blended with less saline soils prior to re-use as backfill." It should be ensured that during storage and/or during blending, saline runoffs are prevented from entering the local water course (Ropes Creek tributary) if high rainfall periods are encountered. It would be advised, that salinity (EC) levels in the Creek be measured when it is flowing, and any waters (such as runoffs or groundwater dewatering) with higher salinity be prevented from entering the creek. High salinity can be toxic to aquatic organisms and plants located onsite and/or downstream from the site of development, especially if discharges contain high bicarbonate together with other toxicants.

This EPA point is agreed in principal and has been documented in the stormwater management plan (civil design drawings). The bio-retention basin will act as a sediment basin during construction. This will allow all runoff to be detained and settled prior to discharging into the Ropes Creek Tributary.

The water report prescribes a testing regime for surface-water discharges and also background monitoring of local waterways. The monitoring regime described in the Soil and Water Report includes testing for salinity and nutrients.

	The bio retention basin is now being used as a storage/treatment pond of runoff stormwater prior to discharge into a tributary of Ropes Creek. Clarification is required regarding any water treatment that will occur prior to discharge (including chemicals used and dosing systems).

It is understood that the basin is a bio-retention basin and will be used for water treatment to the BCC SEPP 59 standards. This basin will be ultimately dedicated to BCC and is designed to meet the required BCC treatment rates and detain the water flows off site to not exceed pre-developed rates.

	Salinity (as electrical conductivity) should be included as one of the water quality targets to be achieved prior to discharge in the CEMP.

Agreed, the monitoring regime in the Edison report includes salinity (electrical conductivity) measurements.

	Further information is required regarding surface water quality and groundwater quality. Additional baseline monitoring should be undertaken to allow appropriate pre-development and operational monitoring requirements.

Agreed. A programme of baseline surface- and groundwater monitoring will be undertaken prior to the commencement of works.

	Consideration should be given to the source of water used in spray dust control devices and any potential inhalation exposure pathways for workers/visitors and any potential off-site receptors.

Water for dust suppression will be obtained from the existing Genesis basin (this source has already been approved for dust suppression (sprinkling) at Genesis so therefore is considered an appropriate source). If/when this supply is exhausted, as can occur in the summer months, the operated will use Sydney Water town supply for dust suppression.

Water for dust suppression will be applied by means of sprinklers rather than sprays, therefore minimizing the potential for the creation of aerosols and inhalation of same.

	Incomplete information regarding the proposed abstraction of groundwater for construction purposes is provided. If any dewatering of groundwater is required during construction stage, is contaminant testing of such water warranted prior to discharge into the creek? Future assessment should include re-testing of the hardness of the creek water. Also, the hardness correction of copper is not recommended as it has been clearly shown that hardness corrected values of copper is not protective of all aquatic species and this may be removed in the reviewed ANZECC guidelines.

Abstraction of groundwater for use in construction is not proposed with the possible exception of the waste bunker excavation, which is addressed elsewhere in this letter.

It is agreed that any groundwater pumped from excavations is to be tested prior to discharge. Note that dewatering is expected to be minimal and associated only with the waste bunker excavation.

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Agreed. Any further assessments can be structured to include testing for hardness.

	There is no estimate in the programme of the quantity of water to be retained for reuse on site during the construction phase. It is likely that the reuse of retained stormwater will be concentrated during the civil works for uses such as dust suppression.

This item related to water retention during construction for use as dust suppression. Readers are referred to the AT&L civil drawings for details on stormwater detention. A detention pond will be constructed at the beginning of the project and utilised for sediment control/dust suppression during civil and construction works.

The amount of water re-use will be based on the amount of rainfall collected in the detention pond during the construction period. The pond is retained as part of the post-construction project. The exhibited Soil and Water report outlines these details and includes a 'water balance schematic', which outlines envisaged water recycling/reuse.

	Insufficient details contained in the EIS to support direct discharge to Ropes Creek Tributary. There is insufficient detail contained in the EIS to support dewatering activities. Detailed investigations to support dewatering and the disposal of pumped/collected water are required.

The civil design (AT&L) describes the stormwater management infrastructure proposed for the construction and post-construction phases of the project. The design includes a bio-retention basin that will be used for water treatment to the BCC SEPP 59 standards. This basin will be ultimately dedicated to BCC and is designed to meet the required BCC treatment rates and detain the water flows off site to not exceed pre-developed rates. Runoff water from the project site will flow through the bio-retention basin and will not discharge directly to Ropes Creek Tributary.

Dewatering is limited to the waste bunker excavation. This matter is addressed elsewhere in this letter.

	No consideration has been made of the OSD quality and its suitability for the water treatment plant or the use of recycled water from offsite"

There is no proposal to use water from OSD in the plant or to use recycled water from off site.

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5. References

Haitjema, H.M.,1992: Groundwater hydraulics considerations regarding landfills. *Water Resources Bulletin*, 27(2), 791-796

Ian Grey Groundwater Consulting, 2007: Proposed Light Horse Landfill Site, Eastern Creek: Detailed Hydrogeological Investigation and Assessment. Report BJ07/RP040 Rev B, September 2009. Prepared for Dial-A-Dump Industries.

IGGC, 2015: Environmental Impact Assessment, Proposed Energy from Waste Facility, Eastern Creek (SSD 6236), Soil and Water. Report ID: BJ07/RP061 Ref F Draft, March 2015. Prepared for The Next Generation NSW Pty Ltd.

5. Closure

Please feel free to contact the undersigned if you require any further information.

Yours sincerely,

Michael Petrozzi
Principal

Attachments:

- Inova HZI water balance for EfW Plant
- Cross section showing interpreted shallow groundwater table (IGGC, 2015)
- Site plan showing location of cross section (AT&L)
- Groundwater seepage calculations into waste bunker excavation

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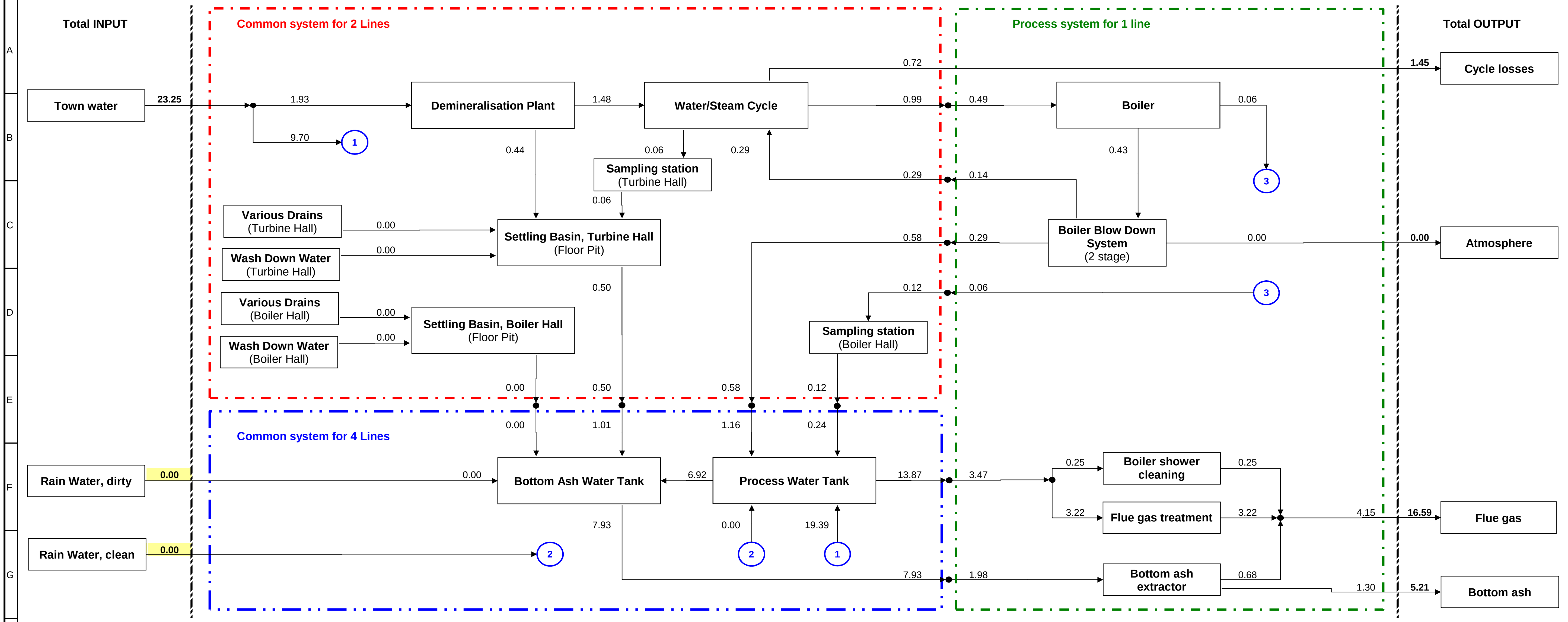
PO Box 564, Balmain NSW 2041



Total water consumption at different load points with 4 Lines running on 100% load:

LP N: 23.25 t/h
LP 1: 26.03 t/h
Max * : 37.33 t/h

Remarks

* : Calculated with
- all boiler with high boiler fouling (FG temp exit boiler 185°C)
- high ash content in the waste (35.0% as per Specification 22A and 42.3 t/h waste)

To be clarified:
- Size of rain water basin/tanks, fire water basin/tank and possible storage basin/tank for other type of water used (attenuation basin)
- Which basin/tanks are actually needed/wanted
- Scope of delivery between HZI and Civil
- Number of floor pits needed within the turbine and boiler building (one for all lines or 1 per 2 Lines?), a question of layout planning and therefore cost evaluation between civil costs and costs for additional piping.

Operating condition
- Normal operation at load point: LPN
- No. of Lines in operation: 4
- Rain water not considered

Mass Balance, status: i.o.
- **Total water input** 23.25 t/h
- **Total water output** 23.25 t/h

Design Data

Thermal power waste	per line	117.4	MW
Waste throughput	per line	34.4	t/h
Ash content waste		21.5%	
Flue gas temp. inlet FGT		170	°C

Remarks
- The unit of all values is t/h (1'000 kg/h) except indicated otherwise.
- The purpose of this mass balance calculation is to determine the overall process water consumption of the plant. The values are mean expected/assumed operating values. Most of the flows are intermitted and not continuous flows.
- Note: the actual water consuption at a specific time depends strongly on two factors:
  1): fouling of the boiler (this influences the flue gas temperature at the exit of the boiler hence the water consumption of the flue gas treatment system)
  2): the ash content of the waste and the composition of the ash (this influences the water consumption of the bottom ash extractor)
- Water steam cycle losses are counted fully as losses despite partly being recovered in bottom ash and process water tanks.
- In this document not all all internal connections are shown and no pumps are displayed.
- The given values shall not be used for pipe sizing purposes since it may not correspond to the design value of it.

Rev.	Date	Description
2.0		
1.0	15.10.15	Bottom ash extractor changed from appron to ram. Results in lower water consumption
0.0		First Issue

Project Name: **Eastern Creek TNG**	Project No: **YE-3267**	Load point: **LPN**

Hitachi Zosen INOVA

	Date	Name
Prepared	15.10.15	Kunz
Checked		
Approved		

Water Balance - Process

Bloc Diagram

HZI doc. N° :	Revision
-	1.0

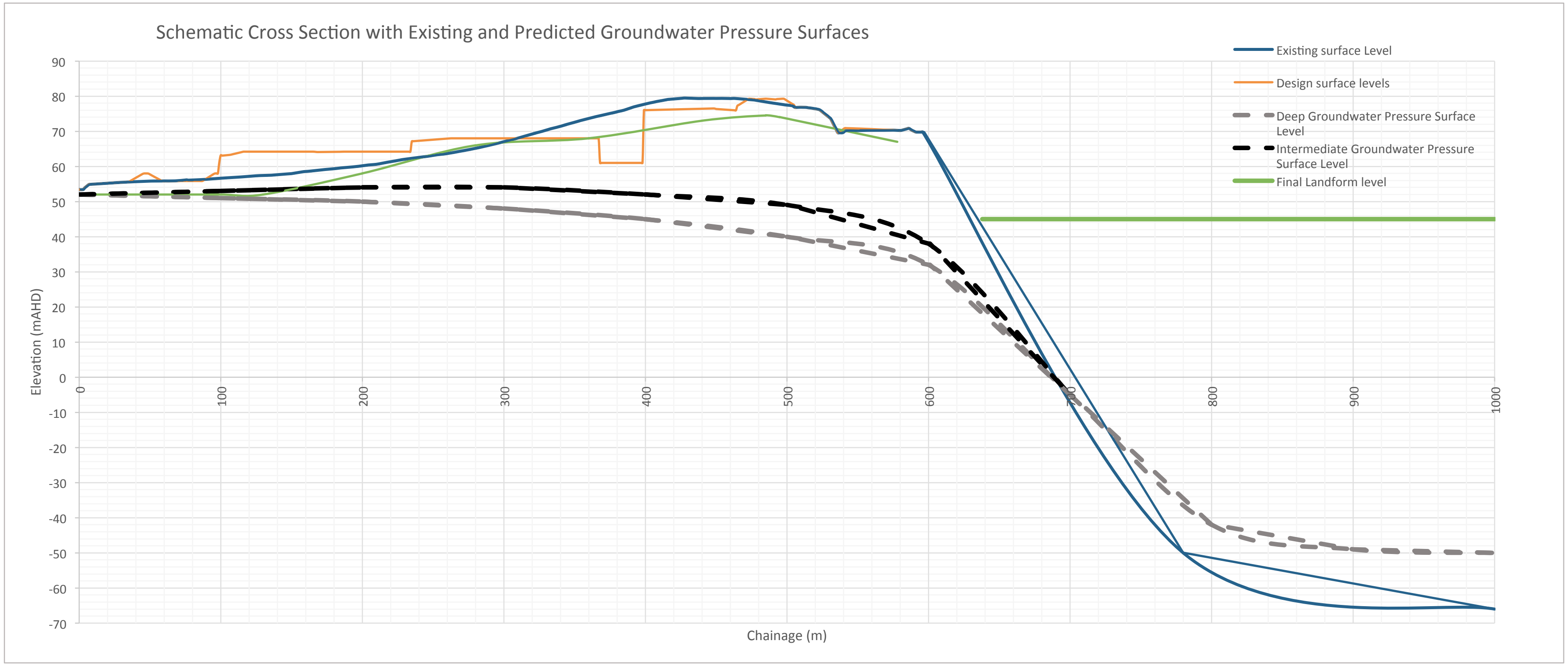
Prog. No. : CSP-104 / V4.2

Print date : 15.10.15 Page : 1/1

R:\VRU-SP\Angebotsprojekte\YE-3267 Eastern Creek TNG1\13 Prozess\03 Fliessbilder\Wasserbilanz\[Eastern Creek TNG_Water Balance_Process_Rev1.0.xlsm]Diagram

Table 5.1: Outline Surface Water Quality Monitoring Plan

Type of Monitoring	Monitoring Frequency	Sampling Locations	Analytical Suite
Pre-Development Characterisation			
Routine	Quarterly	1, 3,4	A
Wet Weather	Target 4 time per year	1, 3, 4	B
Construction Period			
Sediment Basin Discharge	Daily field readings & observations	5, 6	C
	Weekly (monthly after 3 months)	2, 3, 5, 6	B
No Discharge	Monthly	1 to 5	A
Construction Dewatering			
No Discharge	Characterisation prior to discharge as required	7	A
During Discharge	First day of discharge then weekly	2, 3, 5/7	A then B
Post-Construction			
Bio-Retention Basin Discharge	Target of 4 per year for first two years then twice yearly	2, 3, 6	B
Routine	Quarterly for the first two years then six-monthly	1 to 5	A


Schematic Cross Section with Existing and Predicted Groundwater Pressure Surfaces
Existing surface Level
Design surface levels
Deep Groundwater Pressure Surface Level
Intermediate Groundwater Pressure Surface Level
Final Landform level
Elevation (mAHD)
Chainage (m)
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
0
100
200
300
400
500
600
700
800
900
1000

E15002-DADI The Next Generation

Groundwater seepage calculations into waste bunker excavation

1. Walls

Northern wall		
l	110	m
d	9	m
K	5E-07	m/s
Hydraulic gradient	0.158	
Q	0.00008	m3/s
	6.8	m3/d

Southern wall		
l	110	m
d	7	m
K	5E-07	m/s
Hydraulic gradient	0.074	
Q	0.00003	m3/s
	2.5	m3/d

Sum of wall and floor inflow estimates	
32.8	**m3/d**
0.38	**l/s**

Side walls		
l	70	m
d	8	m
K	5E-07	m/s
Hydraulic gradient	0.116	
Q	0.00003	m3/s
	2.8	m3/d

2. Floor

K	0.0000005	m/s
Φd	8	m
Φl	1E-02	m
(Φd-Φl)/Φd	0.99875	
A	3850.00000	m2
Q	0.0	m3/s
	20.7640125	m3/d