Tufanbeyli Mine and Power Plant Development, Turkey

Environmental and Social Review

Final Report
March 2012

Prepared for

Société Générale, WestLB AG, the Korea Trade Insurance Corporation ('K-Sure'), EnerjiSA Enerji Üretim A.S.

Revision Schedule

Tufanbeyli Mine and Power Plant Development
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01	30 Sept 2011	Draft report	**Richard Lowe** Associate Director	Rachel Huxham/ Ros Coverley	**Richard Lowe** Associate Director
02	11 Oct 2011	Revised Draft following CMLA comments	**Richard Lowe** Associate Director	Rachel Huxham/ Ros Coverley	**Richard Lowe** Associate Director
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06	16 Mar 2012	Final following EnerjiSA comments	**Richard Lowe Associate Director**	Ros Coverley Principal Consultant	**Richard Lowe Associate Director**

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1 EXECUTIVE SUMMARY

URS Scott Wilson Ltd (now URS Infrastructure & Environment Ltd) ('URS') was appointed by WestLB and Société Générale, the 'Coordinating Mandated Lead Arrangers' ('CMLAs') on their behalf and also that of the Korea Trade and Insurance Corporation ('K-Sure') to provide environmental and social advisory services related to their proposed investment on a new build 450 MW lignite fired power plant and associated lignite mine, limestone quarry and ancillary operations ('the Project') that is being developed by EnerjiSA Enerji Üretim A.Ş ('EnerjiSA') in Tufanbeyli, Adana Province, Turkey.

This report presents the findings of the due-diligence review, based on information reviewed to date and discussions with EnerjiSA.

It was apparent from early discussions with EnerjiSA that the scope and scale of the project has been developed from that assessed in the initially available environmental information (the EIA and its addendum). However, EnerjiSA subsequently commissioned further studies, including a revised Environmental Impact Assessment (EIA) which included a draft Environmental Management Plan (EMP), and a separate Land Acquisition and Resettlement Action Plan (LARAP) to consider the cumulative impacts of the Project. Note that as no physical resettlement is required, the LARAP, which is based on social surveys, is presented in a Livelihood Restoration Plan (LRP). These studies have been prepared in accordance with IFC standards and were issued in January 2012. A pre-EIA assessment of the proposed transmission route selection process has also been undertaken and was issued in December 2011; with separate EIAs for the two transmission lines to be issued in May 2012.

This report includes consideration of the findings of the above referenced documents plus supporting documentation. URS worked closely with EnerjiSA and their appointed consultants to agree the scope and methodology for each of the assessments and to try and identify and mitigate any potential issues in accordance with IFC standards and the Equator Principles. The due-diligence has sought to identify all major issues which may prejudice the success of the Project and communicate and critical findings during the course of the due diligence process.

1.1 Key Findings

The TPP project development cycle had been underway for some time when the European Lenders became involved. Documentation regarding environmental and social aspects reviewed to date and the ongoing discussions indicate that EnerjiSA is working to compliance with the Equator Principles and IFC Performance Standards.

With the preparation of the recent revised EIA and SIA plus supporting documents, environmental and social aspects of the Project have been assessed in detail by EnerjiSA. Various management plans have been outlined for mitigating key potential environmental impacts. In particular, detailed technical assessments and outline mitigation measures have been developed to manage dust, erosion & sediment control, noise & vibration, blasting operations, solid waste management, river diversion, cultural heritage and the protection of terrestrial and aquatic flora and fauna during construction and operation of the Project. Provided that these plans are implemented and maintained throughout the Project construction and operation, environmental risks associated with these issues should be managed to avoid significant impacts and in turn to achieve compliance with IFC requirements; these plans and commitments should therefore be covenanted under the Project.

Notwithstanding the above, there are several potential residual risks that could remain on the Project:

- **Particulate and Dust Impacts**

  There are predicted to be exceedances of the WHO and EU guidelines for short term and long term particulate concentrations as a result of operation of the Project, predominantly arising from the mining operations, traffic and dumping operations. The predicted impacts exceed IFC requirements. In addition, the existing background concentrations of particulates in the area are already high, so the cumulative impacts of the Project and the background exceed guideline levels.

  While the revised EIA indicates that the predictions are likely to be over-estimates, nevertheless, the predicted impacts appear to exclude several potential sources (notably the stockpiles) and yet are still identified as significant. At this stage the mining contractor for the Project has not yet been selected, therefore EnerjiSA has outlined proposed monitoring and mitigation measures within a Dust Management Plan. This plan will be adopted and developed by the appointed mining contractor in order to demonstrate that the Project can meet IFC requirements during construction and operation. Even with the adoption of the plan, there remains a potential risk that the Project will give rise to elevated dust impacts. The management and monitoring of the mining contractor throughout the Project is therefore considered to be key to maintaining compliance on air quality and dust issues. It is important therefore that – due to the size and complexity of the Project - EnerjiSA creates and maintains a team of sufficient resource and authority to deliver the required level of environmental monitoring and management of site operations.

- **Stakeholder Engagement and Public Consultation**

  Stakeholder engagement is now being undertaken on the Project in accordance with the LRP and forthcoming consultation events are planned based around a brochure that is in preparation plus a presentation of potential visual impacts of the Project. It is recommended that the next round of consultation events is independently monitored to verify that the consultation process and engagement meet IFC/ EP requirements.

- **Thermal Efficiency and Carbon Emissions**

  There is a concern with regard to the justification for the use of the proposed lignite, since the ensuing design of the TPP leads to a proposed thermal efficiency of the Tufanbeyli power plant (circa 34% net) that is below the IFC guidelines, European BAT levels and the level indicated in the Corporate policies of several European Lenders (>40% net). It is recognised that the proposed efficiency is in the top 25% of comparable plants in Turkey, and therefore meets IFC requirements. The design also appears to have been optimised to provide as efficient and operable plant as could be achieved with the quality of lignite, but this still falls short of best practice standards for new build power plants. A separate Carbon Strategy Paper has been drafted to consider potential carbon issues associated with the Project and to demonstrate the need for the development. Nevertheless, this still remains a potential public perception issue for European Lenders.

- **Health and Safety**

  EnerjiSA has developed a robust Health and Safety management policy and plan and has recently expanded the corporate health and safety team. In addition, the TPP Contractor has prepared an HSE Plan for the Project which covers the key issues including site induction, contractor and sub-contractor management and worker safety. It is also understood that the EnerjiSA team regularly audit the Project construction site

and contractors. It is further understood that a comparable HSE Plan will be prepared by the mining contractor once appointed.

Nevertheless, health and safety issues remain a potential reputation risk for the Lenders, since it is understood that there have been incidents and accidents on other construction sites for which EnerjiSA is the Investor and Owner, which are operating under the same corporate policies and procedures. This is a Category A project involving the development of an open cast mine, limestone quarry, power plant and associated roads, transmission lines and infrastructure. Clearly there is the potential for any project of this nature to have an impact on health and safety and it is important that EnerjiSA continues to demonstrate a top-down approach to health and safety and to put in place and maintain a corporate and site team of sufficient resource to manage the required health and safety monitoring and control requirements. This in turn will also provide the correct culture across site management, contractors and sib-contractors alike, for successful implementation of the Project.

2 Introduction and Background

2.1 The Tufanbeyli Mine and Power Plant Project, Turkey

The proposed Tufanbeyli 450 MW lignite fired power plant and associated lignite mine and limestone quarry (hereafter referred to as 'Tufanbeyli' or the 'Project') will be located in Adana province, in Turkey, as shown in Figure 1. The Project is managed by EnerjiSA Enerji Üretim A.Ş ('EnerjiSA'), a 50:50 joint venture between Haci Ömer Sabanci Holding A.Ş ('Sabanci') and VERBUND AG ('Verbund').

The Project comprises a number of elements:

- A lignite mine near Yamanli village, Tufanbeyli District, in Adana province;
- Construction of a 450MW (3 x 150MW) lignite fired thermal power plant (TPP), using circulating fluidised bed boilers (CFBB). Emissions to air from the plant will be abated by the use of a Flue Gas Desulphurisation (FGD) system for removal of sulphur oxides, Selective Non Catalytic Reduction (SNCR) for removal of nitrogen oxides, and Electrostatic Precipitators (ESPs) for the removal of particulate emissions;
- Limestone quarry to provide material for the in-situ fluidised bed FGD; and
- Associated infrastructure related to the development of the mine and operation of the power station – i.e. roads and transmission lines. A bypass road will be constructed going around the north of Taspinar village and a new access road will be built as an extension to the bypass so as to link the TPP with the main road leading to the motorway. Solid waste arisings from the TPP will be sent for long term disposal in specific areas of the lignite mine.

2.2 Terms of Reference

URS Scott Wilson Ltd (now URS Infrastructure & Environment Ltd) ('URS') was appointed by WestLB and Société Générale, the 'Coordinating Mandated Lead Arrangers' ('CMLAs') on their behalf and also that of the Korea Trade and Insurance Corporation ('K-Sure') to provide environmental and social advisory services related to their proposed investment on the above project. The scope of work includes:

- Undertake an environmental and social due diligence on the project and prepare a report reflecting all the available information;
- Identify any major issues which may prejudice the success of the Project; and
- Inform K-Sure, the CMLAs and other potential Lenders of any critical findings which arise during the due diligence review.

The documents supplied by EnerjiSA for review initially comprised:

- *Adana-Tufanbeyli [300MW] power plant, mines supplying fuel for the power plant and limestone deposits EIA Report*, March 2008, prepared by Dokay EIA Environmental Engineering Ltd.

On request, the following documents have also been supplied by EnerjiSA for review:

- *Capacity increase project for Tufanbeyli [450MW] thermal power plant, mines supplying fuel for the power plant and limestone deposits Project Introduction File*, March 2008 also prepared by Dokay;

- *Tufanbeyli Social and Economic Structure Survey, Results of public opinion survey*, October 2008, prepared by Sabanci University – EnerjiSA;
- *Terms of reference for revised Environmental Impact Assessment (EIA) to include the TPP (450MW), mine, limestone quarry and associated roads;*
- *Terms of reference for Social Impact Assessment (SIA) to be undertaken for the proposed development;*
- *EnerjiSA's Corporate Communications procedures and Environmental Management Systems;*
- *Baseline monitoring data for ambient air quality, water quality and noise data in the vicinity of the Project site;*
- *Inception Report for Consultancy Works for Tufanbeyli Lignite Mine Operation,* May 2011, prepared by Vattenfall Europe Mining AG;
- *Application Project for Tufanbeyli Coal Mine and Limestone Quarries,* November 2011, prepared by Vattenfall Europe Mining AG;
- *Mine Development Plan for Tufanbeyli Coal Mine and Limestone Quarries, Turkey,* February 2012 prepared by Vattenfall Europe Mining AG;
- *Mine Development Plan for Tufanbeyli Coal Mine and Limestone Quarries, Turkey,* 17th February 2012 prepared by Vattenfall Europe Mining AG;
- *Environmental Assessment Report for 380kV Tufanbeyli to Afsin-Elbistan B Electricity Transmission Line,* December 2011, prepared by Selin Construction Tourism Consultancy Industry and Trading Company Limited*;*
- *Environmental Assessment Report for 380kV Tufanbeyli to Yesilhisar Electricity Transmission Line,* December 2011, prepared by Selin Construction Tourism Consultancy Industry and Trading Company Limited*;*
- *Presentations on 380kV Tufanbeyli to Afsin-Elbistan B and 380kV Tufanbeyli to Yesilhisar Electricity Transmission Lines,* January 2012.
- *Tufanbeyli TPP Erosion and Sediment Control & Landscaping and Reinstatement Project,* December 2011, prepared by Aity Ankara Advanced Technologies Investments*;*
- *Tufanbeyli TPP Fuel, Mining (Coal) and Limestone Areas Erosion and Sediment Control & Landscaping and Reinstatement Project,* December 2011, prepared by Aity Ankara Advanced Technologies Investments*;*
- *Tufanbeyli Thermal Power Plant Project Environmental Impact Assessment Report,* December 2011, prepared by Encon Environmental Consultancy Co.*;*
- *Tufanbeyli Thermal Power Plant Livelihood Restoration Plan (LRP),* January 2012, prepared by Social Risk Management LLC;
- *Tufanbeyli Thermal Power Plant Livelihood Restoration Plan (LRP) Final Report,* 1st March 2012, prepared by Social Risk Management LLC;
- *Tufanbeyli TPP HSE Plan (TFB-02400-G-HS-0001 Rev B)*, May 2011, prepared by SK Engineering and Construction Ltd;
- *Limestone Operational Permission Maps;*

- *EnerjiSA Environmental and Social Management System & Contractor Environmental and Social Assurance and Monitoring Plan*, undated, received 29th February 2012;
- *Mine Dewatering Plan*, 1st March 2012*;*
- *Residue Management Plan*, 2nd March 2012*;*
- *Noise and Vibration Monitoring Plan*, 2nd March 2012*;*
- *Dust Management Plan*, 2nd March 2012*;*
- *Water Monitoring Plan*, 2nd March 2012.

It was apparent from early discussions with EnerjiSA that the scope and scale of the project has been developed from that assessed in the initially available environmental information (the EIA and its addendum); in particular, the proposed air emissions abatement techniques and associated emission levels for sulphur dioxide and nitrogen oxide were tighter under the EPC Contract for the Project than those presented in the EIA and its addendum.

However, EnerjiSA has commissioned further studies, including a revised Environmental Impact Assessment (EIA), an Environmental Management Plan (EMP), a separate Social Impact Assessment (SIA), a Land Acquisition and Resettlement Action Plan (LARAP) and a Social management Plan (SMP) to consider the cumulative impacts of the construction and operation of the 450MW Tufanbeyli thermal power plant, lignite mine and limestone quarry and related auxiliary/infrastructure facilities. These studies have been prepared in accordance with IFC standards and were issued in January 2012. A pre-EIA assessment of the proposed transmission route selection process has also been undertaken and was issued in December 2012; one of these routes was subsequently modified in January 2012 and separate EIAs for the two transmission lines are to be issued in May 2012. A series of indicative management plans have been prepared and updated to support the overall EMP; while the detailed plans will be the responsibility of the EPC and mining contractors, these indicative plans provide the framework and expectations that EnerjiSA will have for the detailed plans to follow.

This report includes consideration of the findings of the above referenced documents. URS worked closely with EnerjiSA and their appointed consultants to agree the scope and methodology for each of the assessments and to try and identify and mitigate any potential issues in accordance with IFC standards and the Equator Principles.

2.3 Approach

The URS team to undertake the review comprised:

- Richard Lowe, Associate Director
- Christina Petrides/ Rosalind Coverley, Principal Consultants
- Fraser Paterson, Social Impact Assessor

Other specialists have been brought in as necessary.

The work involved a desk-top review of the supplied documentation, discussions with EnerjiSA and a site visit to the proposed development site. Where documents directly related to the project are not yet available, EnerjiSA's corporate strategies have been taken into account.

The document review has been supported by the following face to face meetings:

- 22nd -24th June 2011, including a site visit;

- 15th July 2011 between URS, EnerjiSA and the CMLAs;
- 20th September 2011 between URS, EnerjiSA, the CMLAs and Encon (the consultant employed to undertake the revised Environmental Impact Assessment);
- 30th September 2011, between URS, the CMLAs and SRM (the consultant employed to undertake the Social Impact Assessment), with EnerjiSA joining by telephone
- 23rd – 24th February 2012 between URS, EnerjiSA, the CMLAs, Clifford Chance and Encon.

In addition, URS has issued to EnerjiSA a summary of potential outstanding issues and requests for further information in order to resolve those potential issues. The latest versions of the Risk Register and Clarifications Log are presented in Appendix 1 of this report. There has therefore been ongoing dialogue between EnerjiSA and URS – via the CMLAs – in order to develop sufficient information to demonstrate that there are no significant risks or fatal flaws in the Project.

2.4 Guidance and Standards

The documents provided were compared against the Equator Principles, comprising the 2006 versions of the eight IFC Performance Standards (PS 1-8) and the World Bank Group Environmental Health and Safety (EHS) Guidelines, in accordance with the Terms of Reference, to identify any potential areas of concern for the CMLAs.

Where appropriate, the assessment has also made reference to the changes being introduced by the IFC's revision of its Performance Standards and/or requirements of the revised IFC's EHS Guidelines, which were due to come into force in January 2012. The EHS Guidelines contain specific details with regards to environmental and occupational and community health and safety. In addition to the General EHS Guidelines, Industry Sector Guidelines contain specific information and standards of relevance to this assessment and mitigation of the potential impacts from Project components. Published World Bank/ IFC Industry Guidelines include:

- *Environmental Health and Safety Guidelines for Thermal Power Plants* (Dec 2008);
- *Environmental Health and Safety Guidelines for Mining* (Dec 2007); and
- *Environmental Health and Safety Guidelines for Electrical Power Transmission and Distribution* (April 2007).

3 Site Setting

3.1 Site Location

The Project is located in Kazikli Settlement in Yamanli Village, 10km south of Tufanbeyli District, Adana Province. The power plant is understood to occupy an area of approximately 0.8km^2.

The Project site is located in an area of steppe at approximately 1200m above sea level, with the surrounding area principally steppe and oak forests. The nearest forest is 2km to the south.

The closest settlement to the project is Yamanli Village, 2.8km west of the proposed location of the TPP and approximately 1km from the proposed lignite mine area.

3.2 Hydrology

The Sariz River/ Magara Creek flows from north to south, 2.5km west of the TPP and approximately centrally through the alluvial plain that yields the lignite deposits. The Magara Creek is one of the major sources to the Catalan Dam which provides drinking water for the Adana Province. A number of other small tributaries are present in the area.

3.3 Geology and Hydrogeology

Local permitted groundwater extraction in the Adana-Tufanbeyli area is 2Mm^3 per annum, with potential for 14.5Mm^3 per annum.

3.4 Receptors

The nearest human population is Yamanli Village (approximately 750 persons) located 2.8km west of the TPP, which is on the western boundary of the proposed lignite mine. There are four other villages in the local vicinity (Pinarlar, Taspinar, Kayircik and Yesilova). The total population of the Tufanbeyli District in 2011 was approximately 17,500.

The surface waters in the area are used for drinking water, irrigation and livestock. The surface waters also support amphibians.

The closest forested area to the Project site is 2km to the south.

Protected areas in the region include the Kurebeli Canyon Wildlife Development site (45,000ha) located 17km northwest of the Project site, which is designated for game animals, and an important archaeological site, 'Sar' city which was the regional centre of the Hittites, located approximately 20km to the north east of the Tufanbeyli District.

There is one endangered and internationally protected endemic flora species and there are 5 near-threatened species present at the Project site; all 6 species are widely present in the surrounding area. The Project site itself is typically agricultural and natural vegetation is limited. The natural habitats on the project site have lost many of their sensitivities and properties due to agricultural activities, destruction of forests and grazing and no significant impacts were identified in the recent revised EIA. The most important habitats that could be affected by the Project are outside the project area. Nevertheless, seeds of the endangered species will be collected prior to site clearance being undertaken and added to a seed bank, to allow reinstatement following site restoration.

There are 15 reptile species present in the local area which are protected by the Bern Convention 1979. A recent ecology survey identified up to 50 bird species in the region and up

to 15 mammalian species. No globally threatened species of mammals or birds have been identified. Any species identified on the project site are also present in the wider area.

On the basis of information received to date, no significant impacts on ecological receptors are predicted from the Project.

3.5 Topography

The area around Magara Creek is generally flat, rising steeply 10km to the south east by more than 1000m. Undulating topography is present 4km to the east and 2km to the west.

4 Potential Environmental Issues

4.1 Introduction

URS has considered potentially significant environmental impacts associated with the Project, based on experience of similar projects of this scale and nature. The project is categorised as a Category A project as it has the potential to have significant adverse environmental impacts that are irreversible, diverse or unprecedented.

An assessment has been undertaken by EnerjiSA of the potentially significant environmental and social impacts of the Project. The proposed mitigation measures to render any potential impacts harmless, as outlined in the revised EIA and Livelihood Restoration Plan (LRP), have been identified and reported. These have been formalised into the Project Environmental and Social Management Plan (ESMP), the Environmental Management Plan (EMP) and associated management and control plans, including technical details of each mitigation measure together with designs, equipment descriptions and operating procedures, as appropriate, as outlined in the IFC Procedure for Environmental and Social Review of Projects.

At this stage, the mining contractor has not yet been appointed and consequently the detailed management plans relating to mining operations have not been finalised, since they are the responsibility of the mining contractor. In these cases, EnerjiSA has prepared indicative plans that provide the framework and expectations that EnerjiSA will expect the detailed plans to follow.

4.2 Thermal Efficiency

EnerjiSA have specified a boiler design which will be capable of firing the relatively poor quality and variable lignite from the Tufanbeyli mine (Tufanbeyli lignite quality 5.1MJ/kg; typical range 4.4 - 6.7 MJ/kg). The net thermal efficiency of the boiler is calculated to be around 34% on the basis of this fuel. It is understood that this is considered to be around the highest efficiency that is achievable based on the fuel quality.

The IFC Environmental, Health and Safety Guidelines for Thermal Power Plants indicates that to avoid, minimise and offset emissions of carbon dioxide from new and existing thermal power plants, the following measures are recommended:

- Use of less intensive carbon fuels;
- Use of combined heat and power (CHP) where feasible;
- Use of higher energy conversion efficiency technology of the same fuel type/ power plant size than that of the country/ region. New facilities should be aimed to be in the top quartile of the country/ region average of the same fuel type and power plant size;
- Consider efficiency relevant trade-offs between capital and operating costs involved in the use of different technologies. However, it is recognised that characteristics of the grid may impose limitations in plant size and hence technology selection;
- Use of high performance monitoring and process control techniques, good design and maintenance of the combustion system so that initially designed efficiency performance can be maintained.

The IFC Guideline indicates the typical emissions performance of a range of new fossil fuel power plants and indicates that lignite fired plants can achieve efficiencies greater than 40% net on an LHV basis for fluidized bed combustion.

Although not a formal requirement for this Project, it is considered pertinent to note that in Europe, new plants are developed with full consideration of the use of Best Available Techniques (BAT). The techniques and achievable emission levels associated with the use of BAT are developed on a sector by sector basis by industries in conjunction with regulators and are published in BAT Reference documents ('BREF Notes') that are periodically updated to reflect emerging technologies as they become commercially available and proven.

The most recent BREF Note for thermal power plants is the Large Combustion Plants July 2006. This indicates that new plants using Fluidised Bed Combustion of lignite should be able to achieve greater than 40% net thermal efficiency. This is consistent with the levels indicated to be achievable in the IFC Guideline discussed above.

On face value therefore, the proposed thermal efficiency of the Tufanbeyli power plant of less than 36% net does not meet the net efficiency target reported in the IFC guidelines or European BREF criteria for use of Best Available Techniques (BAT). It is also below the level indicated in the Corporate policies of several European Lenders.

A justification of the departure from the above net efficiency target is presented as part of a standalone carbon strategy paper for the proposed Project, which is presented in Appendix 2. This paper demonstrates that there is a strong need for the development in order to meet a projected energy shortfall in Turkey, to improve the security of supply through the use of in-country natural resources and to improve the reliability and resilience of the transmission network across the country. Utilisation of in-country lignite fits with the national Turkish energy strategy.

Various alternative sites were considered for the Project and Tufanbeyli was identified as it is ideally located from the perspective of the availability of natural resources (lignite, limestone, water) adjacent to the plant, avoidance of large population centres and avoidance of sensitive ecological and cultural heritage receptors. Tufanbeyli lignite mine also has the lowest mining cost in Turkey due to its better stripping ratio and other site conditions relative to other mines. However, the Tufanbeyli lignite is recognised to be of relatively poor quality and high moisture content.

There are four main reasons for the reduction in net efficiency of the Tufanbeyli power plant from indicative BAT levels:

- Technology selection

  The choice of boiler design and technology was selected to be as robust as possible for the combustion of the poor quality lignite and to be as flexible as possible to variations in fuel quality. This precluded the use of higher efficiency, higher capital cost technologies such as super-critical systems for example.

- Use of indirect cooling

  An indirect dry cooling system has been selected for this project in order to minimise water abstraction in the area and protect existing water resources. This allows the project to largely balance water resources, from the dewatering of the lignite mine to use within the power plant and then return with the wetted ash and gypsum slurry. It also prevents the generation of significant visible plumes or thermal discharges to receiving water bodies. While this cooling option leads to a 2% reduction in plant thermal efficiency, it is considered to represent BAT for the project as a whole, when considering the availability of water in the area.

- Use of over-sized fans, coal feeders and electrostatic precipitators

The higher parasitic load of Tufanbeyli TPP reduces the thermal efficiency by approximately 0.5%. The high moisture and high ash content of the fuel necessitates the use of larger boiler furnaces and convective sections and larger auxiliaries including fuel handling, fans, ash removal, flues and ducts, etc. The control of excess surface moisture is critically important in order to have a fuel which is capable of handling without sticking and all fuel handling systems must be conservatively designed and sized with these issues in mind.

- Use of higher flue-gas temperature

  The flue gas temperature is 166°C at the boiler outlet which is approximately 25-30°C higher than normal practice. This is because the sulphur content of the flue gas is still high at this point (~3000 mg/Nm^3) so the dew point of the flue gas is high (~152°C) and it is important to maintain the gas temperature over the dew point to minimise corrosion.

Due to the combination of these four reasons, the net design efficiency of TPP is around 5.5% lower than the indicative BAT level. There are likely to be further losses associated with incomplete combustion, resulting in a design guarantee of around 34%. According to an independent technical review (Shaw Consultants Final report, October 2011) it is appropriate for various plant components to be oversized to improve operability for the type of fuel being consumed.

Nevertheless, in comparison with other lignite fired power plants in Turkey, it can be assessed that Tufanbeyli TPP will be in the top 25% on thermal efficiency, with other Turkish plants achieving gross efficiencies of between 28% and 35.5%. The proposed Tufanbeyli plant therefore complies with the IFC guidance requirement outlined above. In addition, as outlined in the carbon statement, various other efficiency-improving measures such as coal drying may be trialled or considered once the plant is operational.

In consideration of the other measures recommended in the IFC guidance:

- It is recognised that given the rural plant location, the use of Combined Heat and Power (CHP) (to utilise low grade heat in off-site heat sinks) may not be appropriate for this Project, since there are no identified industrial heat or low grade steam users in proximity to the plant. There are also no substantial residential or commercial developments in the vicinity that may be able to develop a district heating system for example. However, for completeness it is recommended that the situation is re-evaluated at the time of plant construction, to demonstrate to third parties that CHP opportunities have been properly considered;
- High performance monitoring techniques will be implemented to ensure that the initially designed efficiency performance of Tufanbeyli TPP can be closely monitored and maintained.

Carbon intensity is discussed separately in Section 4.3.

4.3 Carbon Emissions

4.3.1 Carbon Intensity

It is recognised that the carbon intensity of lignite is high compared to other fossil fuels such as bituminous coal, gas and oil. However, the need for the Project and the benefits of using the lignite from this location as outlined in Section 4.2 are considered to justify its use.

The feasibility of whether the plant could theoretically co-fire biomass in the future has not been assessed to date. If reliable and sustainable biomass supplies could be developed, sourced and consistently delivered to the plant, this could be evaluated in the future. However, at this stage, biomass supply and distribution is not considered to be viable for the project given its location.

In addition, the proposed lignite-fired plant is the first solid fossil fuelled development within EnerjiSA's portfolio, which to date has predominantly centred on the development of hydroelectric schemes, supported by one new build Combined Cycle Gas Turbine (CCGT). Consequently, the current carbon intensity of EnerjiSA's operations is lower than the average for Turkey, as outlined in the Carbon strategy paper.

4.3.2 Carbon Capture and Storage

As indicated in World Bank guidance, the application of carbon capture and storage (CCS) from thermal power projects is still in experimental stages worldwide although consideration has started to be given to CCS-ready design. As outlined in the Carbon Strategy paper, high level consideration has been given to the availability of space adjacent to the power plant for potential future retrofitting of carbon capture technology, should this become a viable technology in the future. While not a formal requirement for this project, it is worthwhile to recognise that the demonstration of Carbon Capture Readiness is now an EU requirement for all new Large Combustion Plant (LCP) under the Industrial Emissions Directive (IED, 2010/75/EU, Article 36).

It is recognised that the necessary regulatory, political and financial frameworks for new build CCS do not exist within Turkey, or in a mature form in any country, at present. There is also no immediate anticipated regulatory requirement for CCS within Turkey. However, the European situation is becoming clearer with regard to the development of CCS technology, through the IED and the EU Directive on geological storage of CO_2 (Directive 2001/80/EC). It is therefore reasonable to expect that the international position with regard to carbon capture and storage from fossil fuel power generation is likely to change within the lifetime of a new build power plant.

In the European context, anticipated future regulation to limit CO_2 emissions raises the prospect of stranded power generation assets, rendered unusable due to emissions above the regulated limits. Whilst regulation of this kind is not immediately anticipated in Turkey, the prospect of an economic disadvantage for plant unable to capture CO_2 in the future remains a plausible risk. Investment in a capture-ready plant therefore offers both the option to take advantage of future economic opportunities to abate CO_2 emissions and a hedge against future regulatory change.

At this stage, there is no expectation for CO_2 capture technology to be installed when the coal plant is originally built, due to a lack of sufficient regulatory drivers or economic incentives at the time of construction. However, it is recognised within the international community that the design of new-build plant as 'ready' for CO_2 capture to be retrofitted at some later point during the plant lifetime ('capture-ready') is prudent, to avoid carbon lock-in should regulation change in the future.

The International Energy Agency (IEA) GHG definition for capture-ready plant outlines the essential considerations that would apply globally to thermal generation plant:

'A CO_2 capture ready power plant is a plant which can include CO_2 capture when the necessary regulatory or economic drivers are in place. The aim of building plants that are capture ready is to reduce the risk of stranded assets and 'carbon lock-in'.

According to the IEA, in the event of carbon capture retrofitting in the future, space would be required for the following:

- CO_2 capture equipment.
- Boiler island additions and modifications (e.g. space for routing flue gas duct between ID fan and amine scrubber).
- Steam turbine island additions and modifications (e.g. space in steam turbine building for routing large low pressure steam pipe to amine scrubber unit).
- Extension and addition of balance of plant systems to cater for the additional requirements of the capture equipment.
- Additional vehicle movement (amine transport etc.).
- Space allocation based on hazard and operability (HAZOP) management studies, considering storage and handling of amines and handling of CO_2.

Typical carbon capture space requirements based on 2008 IEA Greenhouse gas report for a pulverised fuel power plant: 127m x 75m for a 500MW plant = 10,000m^2. This is the additional area for carbon capture systems in addition to the footprint of the power plant itself.

Enerjisa confirms that a potential area of 16,000 – 20,000 m^2 is theoretically available adjacent to the Tufanbeyli power plant for such use if eventually required. A separate area required for construction laydown can also be provided.

It is likely that future retrofitting of carbon capture equipment would also need additional water supply beyond that for the main power plant, to provide additional cooling and meet additional steam demand. At this stage, the water supply requirement of any carbon capture plant is not known. However, assuming that any additional water demand is of the order of 25% of the water requirement of the power plant, this volume could be supplied from the power plant raw water source if necessary. Additional groundwater abstraction capacity would be available from the proposed boreholes for the Project if required.

4.4 Solid Waste Generation and Disposal

It is understood that the Project proposes to collect and mix fly ash, bottom ash and gypsum slurry waste and mix them at the TPP site before transporting the resultant residue to the mine for emplacement and long term waste disposal. An outside dump will be used initially, until sufficient void space is available in the lignite mine for long term storage, as discussed below. An interim waste storage site located to the west of the TPP plant will be used as a transfer point between belt conveyors from the TPP ash handling system and trucks used to place the residue.

Estimated residue volumes generated by the plant operation are 61 tonnes per hour (t/h) of bottom ash, 243 t/h of fly ash and 32 t/h of gypsum slurry.

Ash Beneficiation

In accordance with best practice, EnerjiSA has considered and evaluated the possibility of employing ash beneficiation at the plant.

Ash beneficiation (separation of coarse particles from fines, separation of gypsum from waste products of flue gas desulphurisation) would usually be considered BAT for reuse of wastes and can save disposal costs and generate revenue, for example through use of gypsum in

cement products. However, EnerjiSA cites the publication 'Classification and Specification of Fly Ashes in Turkey' by Turkish Cement Manufacturer's Association, indicating that the ash would be unsuitable for use in cement products due to radioactivity exceeding the national and internationally permitted levels. The proposed Tufanbeyli lignite shows similar characteristics to Afşin-Elbistan and Kangal reserves; ash produced from both these reserves cannot be used due to its radioactivity exceeding the limit value.

In addition, EnerjiSA reports that there are no cement plants within 250 km of the Tufanbeyli project site and therefore the high transport costs would make such use of the Tufanbeyli ash uneconomically viable. Natural high quality gypsum is reportedly readily available in Turkey at relatively low cost.

URS therefore concurs that ash beneficiation is not economic or appropriate for this Project at this time, although opportunities for its use should be periodically reviewed over the life of the project in case the situation changes.

Proposed TPP Residue Disposal

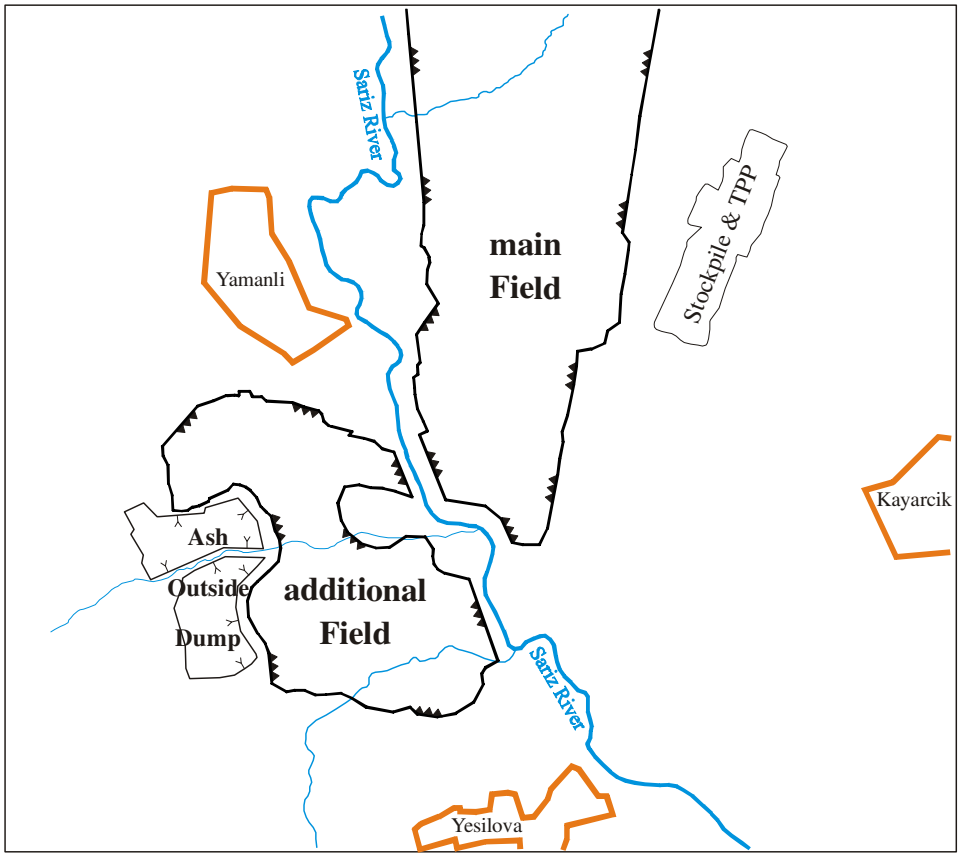
Where beneficial use is not possible, ash should be disposed of in an appropriately managed waste facility. It is understood that the bottom ash will be discharged at elevated temperatures (up to 900°C) and therefore will require indirectly cooling with water before discharge onto conveyor and into silo storage. Fly ash is also collected in dedicated silos. When it is to be discharged, ash from the silos is dropped onto conveyors, and directed to bucket elevators which drop the ash into mixing mills. In the mills, the ash is mixed with gypsum slurry from the FGD system and treated TPP wastewater, producing a relatively homogeneous and wetted waste stream (15-20% moisture by weight). This is likely to minimise fugitive dust emissions from the transport of waste to the mine for disposal.

It is proposed that in the long term, the waste is placed into an engineered dump site located in previously worked areas of the lignite mine using trucks. The sealed dump site will be sited on top of the unbroken, low permeability natural clay layer that is present at a thickness of up to 30 m or more in places. This will ensure that the residue will remain above the post-mining groundwater level.

For the first years of mine operation, there will be insufficient void space in the mine for the TPP residue storage, therefore an alternative storage location is proposed (denoted the "outside dump 1") until sufficient space is available. The outside residue dump is proposed to be located to the west of the additional lignite field, to the west of the Sariz River and south of Yamanli, as shown in Figure 4.1 (taken from Vattenfall report 'Mine Development Plan for Tufanbeyli Coal Mine and Limsetone Quarries, Turkey, February 2012). A belt conveyor will transport the TPP residues from the power plant to the interim residue transfer point located to the west of the TPP, with a stacker used to dump the residues on the outside dump. When final emplacement of the residues takes place, a wheel loader will extract the residues from the outside dump and fill trucks to transport them to the final waste disposal location within the mine.

Both the outside dump and the final inside storage location will be constructed as engineered sealed storage locations.

Figure 4.1: Schematic of lignite mine and outside dump location



It is recognised that waste emplacement will give rise to leachate generation from any rainwater percolating through the waste. Depending on the strength and volume of leachate, this has the potential to form a plume that could impact on the surrounding groundwater or nearby surface water bodies. EnerjiSA's stated corporate policy on ash leachate is to avoid leachate to groundwater.

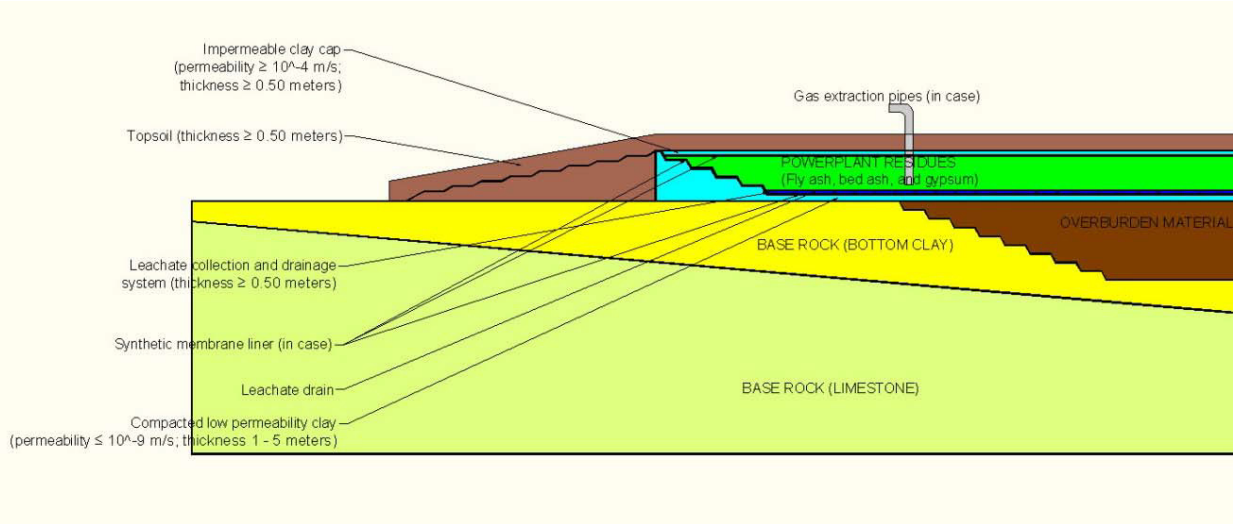
As the plant is not yet operational, the leachability of the waste streams and any Acid Rock Drainage (ARD) associated with the Project are currently unknown. Therefore EnerjiSA has commissioned leachate testing of numerous samples of clay, silt, coal and other strata from the mine area together with testing of fly ash and gypsum waste from a comparable power plant at Afsin-Elbistan B. The results of this testing are presented in the revised EIA and show elevated levels of sulphates, some heavy metals and pH.

However, the study concluded that the short term tests that were undertaken will not provide an understanding of potential long term leachate generation issues, and that kinetic tests of waste samples should be undertaken to see the time related changes of pollutant concentrations in the leachate. This information could then be used in hydrogeological modelling to assess the associated potential environmental risks of waste disposal at the site.

In the absence of definitive leachate data, until further studies (including further groundwater modelling) are conducted, based on the preliminary findings it has been decided by EnerjiSA that measures will need to be implemented at the design stage in order to minimise the risk of

ground and surface water contamination. Therefore a landfilling concept has been developed for the design of the TPP residue disposal site. This concept is reproduced from the revised EIA in Figure 4.2 below. This level of design and protection will be used for both the outside dump and the long term storage locations, unless it can be demonstrated that there are no risks to groundwater or surface water from alternative storage methods.

Figure 4.2: Schematic of proposed TPP waste disposal site



The site will be designed using geotechnical investigation to ensure slope stability. The proposed design includes the use of an engineered base layer, sealing layer and sides using clay of sufficient thickness that meets the permeability requirements of less than or equal to 1 x 10^{-9} m/s. The base clay layer will be installed layer-wise and compacted to a depth of 1 m on the assumption that the residue is classified as non-hazardous waste. Over this clay layer a drainage layer will be installed.

The leachate generated would be collected by drainage pipes installed in the dump area. The collected leachate would be directed to a treatment plant and treated as appropriate to allow its reuse as part of the wider water balance for the Project. The treated leachate would be directed to a leachate storage basin and monitored for a suite of determinands prior to discharge into the Project water system; treated leachate will not be directly discharged to the environment.

Relevant drainage measures would be taken around the dump area in order to prevent intrusion of storm-water into the residue.

Following residue emplacement, a sealing layer will be added to cap the residue and prevent rainwater ingress. The cap will be installed within 18 months of residue emplacement. The sealing layer will consist of a 1 m thick compacted clay layer overlain by a drainage layer and soil to facilitate revegetation and restoration.

It is recognised that the Demircik Creek and Sariz River are within 50-200 m of the proposed residue storage locations at their closest points, which is within the recommended 300 m buffer distance indicated in IFC Guidance (IFC Environmental, Health and Safety Guidelines for Waste Management Facilities 2007) for perennial streams. However, notwithstanding the precautionary approach being taken to the design of the residue emplacement facilities, there

will additionally be clay slurry walls installed between the surface watercourses and the residue storage areas, which would inhibit any migration of leachate into the surface waters.

To avoid water ingress from the Sariz River and Demircik Creek into the mine area through the relatively permeable alluvium sands and gravels, EnerjiSA proposes to excavate trenches and install slurry walls. The slurry walls will therefore also have the effect of preventing any leachate from the residue storage sites from reaching the surface water courses.

The slurry trenches will be excavated along the mine boundary where the alluvium to a depth of 3 to 5 m. These trenches, which will be excavated in the pervious alluvial units, will be filled with impervious clay material. In doing so, the alluvial layer and the Sariz River and Demircik Creek will not influence the mine drainage. This will also protect both Demircik Creek and Sariz River by separating the waste sites from the Creek and the River. The total length of the trenches to be excavated along the Creek and River during the first 12 years operation period will totally be approximately 4,400 m.

There is a separate seasonal creek that runs through the proposed Outside Dump during the wet season and flows into the Sariz River. It is not proposed that this will be diverted or culverted, but the residue emplacement will be kept at least 40 m away from the creek bed.

The engineering concept for disposal of residues has been proposed, taking into consideration international good practice to minimise environmental contamination risks. It is understood that this will be formalised by the mining contractor as a method statement for ash and residue disposal considering (among other issues) clay compaction/ waste emplacement/ waste capping.

Prior to appointment of the mining contractor, a Residue Disposal Management Plan and Water Monitoring Plan have been prepared. These Plans cover outline technical details of proposed residue emplacement, groundwater and leachate monitoring to demonstrate ongoing compliance and protection of water resources. The monitoring plan also covers the proposed monitoring locations, testing frequencies and trigger levels for emergency response to any changes in impact. It also details the responsibilities, reporting regime, operating procedures and training requirements for management of the residue storage facilities and handling operations.

Through the use of appropriately designed and managed waste disposal sites, it is highly unlikely that leachate would impact on the groundwater or surface waters.

The proposed approach to TPP residue management as outlined above is in accordance with the international position on landfilling of waste, which is as follows:

Landfills for hazardous and non-hazardous waste should be regarded as having the potential to produce leachate containing hazardous substances and non-hazardous pollutants. The consideration of the presence of hazardous substances and non-hazardous pollutants would normally take place at the risk screening stage.

For aquifers ... the impact of long term pollution should be considered on a site by site, risk assessment basis. It may be possible to place greater reliance on natural geological barriers and/or artificial mineral barriers for long term protection of groundwater, depending on the particular geological and hydrogeological circumstances. However, requirements to mitigate the long-term degradation of artificial sealing layers and management control systems and to protect groundwater ... will need to be satisfied.

The need for a geological barrier, bottom or top liner can only be removed where it is evident from a risk assessment (i.e. considering the site conceptual model) that the inclusion of one of

those elements would not contribute to environmental protection. Where the risk assessment shows that inclusion of one of those elements is likely to provide a negligible contribution to the protection of soil and water ... that element may be unnecessary.

Once site-specific leachate data is available, a full risk assessment will be undertaken, taking into consideration:

- leachability evaluation of the waste streams;
- permeability and thickness testing of the clay liner underlying the mine (which has been undertaken);
- evaluation of groundwater flow around or through the natural clay layer (work is ongoing);
- monitoring of baseline groundwater quality (which is understood to be ongoing);
- potential rainwater ingress and percolation through the waste;
- potential for surface/ groundwater flooding of the waste disposal area and ultimately the risk of groundwater contamination both during and post mining operations;

This risk assessment will inform the final design of the residue disposal site.

4.5 Air Emissions

4.5.1 Introduction

The permitting of coal-fired power stations is typically governed by World Bank/ International Finance Corporation guidelines (Environmental, Health and Safety Guidelines – Thermal Power Plants, 2008). These guidelines set the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account.

If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

While not required for this project, Lenders can require consideration of EU standards, such as the Large Combustion Plant Directive (currently being transposed into the Industrial Emissions Directive). EU regulation demands the use of Best Available Techniques (BAT) to meet specific emission limit values and performance standards. BAT is outlined in sector-specific guidance such as the EU BAT Reference documents for Large Combustion Plant or for Industrial Cooling Systems.

For new build plant, BAT must be demonstrated and applied prior to operation; older plant have to implement an improvement programme to meet emission levels associated with the use of BAT, but taking into consideration cost-benefit justifications.

The philosophy of BAT is to prevent, or where not possible, to minimise emissions so as to prevent significant impacts on the environment. As a result, the hierarchy of emissions control is to:

- prevent emissions occurring in the first place – through primary process design measures for example;
- control any residual emission by abatement techniques (secondary measures);
- ensure adequate dispersion of any residual emission into the environment so as to not cause harm or nuisance.

It is understood from a review of the EPC Contract and Design Guarantee that the proposed plant will meet EU emission limit values for new build solid fuel plants greater than 300 MW, as prescribed in the Industrial Emissions Directive (IED). This meets EU Best Available Techniques (BAT) and IFC Thermal Power Plant Guideline requirements for new build lignite fired plant and is a positive step from the position outlined in the original EIA and EIA Addendum, which initially stated that Turkish national standards (RCAPOIE) would be met, which fall short of EU IED emission limit values.

The EPC contract specifies that the following emission limit values (Table 4.1) are to be met for the plant operating from minimum load up to full load for the range of coals specified in the EPC contract:

Table 4.1 – Proposed Design Emission Limit Values (ELVs)

Pollutant	**Proposed Emission Limit Value (mg/Nm^3)***
NOx (as NO_2)	200
SO_2	200
Particulate Matter (PM)	30
CO	200
HCl	100
HF	15

* measured under normalised conditions, for dry gas at 6% oxygen content

4.5.2 Baseline air quality

Monthly baseline monitoring data has been taken in the vicinity of the Project between August 2007 and August 2009, which has been translated for review. Ambient air monitoring has been undertaken for NO_x (as NO_2) and SO_2 using diffusion tubes, PM_{10} using gravimetric samplers and settleable dust.

Initial review of the data indicates that background NO_x and SO_2 levels are generally low and consistently below the air quality standards for Turkey and the EU. However, PM_{10} concentrations are already elevated and while they are predominantly below the Turkish short term air quality standard of 150 µg/m^3, in some areas the average measured short term concentrations are close to 50 µg/m^3, which is the EU/ WHO 24 hour average ambient air

quality objective/ guideline (with 35 exceedances of this level per year allowed in the EU objective). The long term (annual) average concentration is measured to be around 30 µg/m^3, compared with the EU annual average objective of 40 µg/m^3 and the WHO guideline of 20 µg/m^3. The WHO interim target-3 of 30 µg/m^3 may therefore be appropriate in this instance, given the background concentration already exceeds the WHO guideline.

With the addition of activities associated with the power plant, mine and quarry, there is therefore a significant risk that PM_{10} concentrations are predicted to rise beyond this level, as discussed below. Exceedance of the 50 µg/m^3 short term concentration or 20 µg/m^3 annual average concentration could give rise to a degraded airshed, although as discussed above, the background level is already higher than the WHO guideline, so an interim target may be more appropriate to use.

Settleable dust levels are consistently below the guideline level of 350 mg/m^2/d.

4.5.3 Emissions of Nitrogen Oxides (NOx)

NOx emissions are to be controlled through a combination of primary and secondary measures. During normal operation, it is expected that the primary measures should be sufficient to meet the ELV. However, under reduced load the ELV may not be achieved and consequently a urea-based Selective Non Catalytic Reduction (SNCR) secondary abatement system is also to be installed. A technical evaluation of the SNCR system has been provided by Shaw Consultants in their Technical Review Due Diligence report. Use of SNCR can lead to additional emissions to air of ammonia, which is discussed further below.

Use of primary and secondary measures to meet the ELV shown in Table 4.1 is considered by URS to represent BAT for a new build plant and to meet IFC requirements.

4.5.4 Emissions of Sulphur Dioxide (SO_2)

SO_2 emissions are directly correlated to the sulphur content of the fuel, with typically around 90% of fuel sulphur emitted to air as SO_2.

As outlined in the EPC Contract, sulphur dioxide emissions are to be controlled through a combination of limestone injection into the fluidized bed boilers and operation of a wet scrubber Flue Gas Desulphurisation (FGD) system.

For the limestone injection system, screened and crushed limestone is pneumatically conveyed into the boilers in order to achieve an 85% reduction in sulphur dioxide emissions.

The FGD system uses limestone slurry to react with the residual sulphur dioxide in the flue gas, through direct contact in a scrubber spray tower. This forms a gypsum slurry which is drained off and stored in dedicated tanks prior to mixing with the solid ash as discussed in Section 4.2.3. FGD systems can achieve up to a 98% reduction in sulphur dioxide emissions.

A technical evaluation of the sulphur dioxide control system has been provided by Shaw Consultants in their Technical Review Due Diligence report.

Use of direct limestone injection and wet FGD scrubbing to meet the ELV shown in Table 4.1 is considered by URS to represent BAT for a new build plant and to meet IFC requirements.

4.5.5 Emissions of Particulates (PM) from the Boilers

PM emissions are potentially significant from coal-fired combustion, but not dissimilar to the levels generated from the combustion of heavy fuel oil. Typically PM emissions are

predominantly controlled by secondary means and two technologies are considered to represent BAT:

- Electrostatic Precipitators (ESPs), which can achieve particulate removal efficiencies of up to 96% of fine particulates;
- Bag (fabric) filters, which can achieve particulate removal efficiencies of up to 99.5% of fine particulates.

The choice of technology is dependent on the plant size, fuel properties, type of SO_2 FGD abatement installed (see above), and sensitivity of the receiving environment.

Bag filters tend to achieve higher performance levels than ESPs, especially for fine particles, but are more expensive and onerous to maintain and the bags degrade more rapidly when higher sulphur coals are used. ESPs tend to be installed on larger plant as they can handle large gas volumes with low pressure drop, but are less effective where particulates are of high resistivity – in this case, additional flue gas conditioning may be required. Cyclones and wet scrubbers are not considered to represent BAT for the control of PM emissions.

It is understood from the EPC contract that ESPs will be installed to remove particulate matter from the flue gas, although the vendor has not been selected at this time. ESPs are capable of meeting the ELV shown in Table 4.1. This ELV meets IFC guidelines and current EU limits for large combustion plant, although it should be noted that the EU IED 2010 indicates a particulate emission limit value of 10mg/m^3 should be achieved from lignite-fired boilers, which is more stringent than the previous value published in the EU Large Combustion Plant Directive 2001. While not a formal requirement for this project, it would be prudent to consider whether a tighter limit such as the IED limit could be achievable on this plant in the future.

Nevertheless, use of ESPs to meet the ELV shown in Table 4.1 is considered by URS to meet IFC requirements.

4.5.6 Emissions of Particulates and Dust from Materials Handling

The following operations have the potential to give rise to particulate and dust emissions to air. Methods for minimising the dust emissions are also identified:

- Soil stripping, transport and stockpiling prior to operation of the mine. EnerjiSA proposes that temporary dust generation from soil stripping works will be mitigated by water spraying. The long term stockpiles will be seeded and grassed to minimise wind blown erosion. The requirements for dust control will be stipulated in the mining contract and dust mitigation measures will be the responsibility of the contractor;

- Extraction of lignite and transfer to truck on haul roads within the mine. While truck loading is not seen as a significant dust risk due to the lignite being moist, truck movements within the mine are potentially a dusty operation and the dust will be minimised by the wetting of haul roads, with particular attention on the western mine boundary in proximity to the village of Yamanli. A further protection “wall” with water spraying may also be located between the village and the mine;

- Crushing of lignite within the mine. This will take place on the eastern side of the mine and dust will be mitigated through the use of water sprays;

- Conveying of lignite to TPP stockpile. Enclosed belt conveyors are proposed for the transfer of lignite from the mine to the stockpile; the transfer towers will be wetted to minimise dust emissions;

- Storage of lignite at the TPP stockpiles. Three stockpiles will be used. Dust generation from the stockpile operations can be minimised by the use of dust suppression, possibly with the addition of wetting agents, if considered necessary. Drop heights from conveyors should also be minimised, together with minimising interference of the stockpile once placed. It is recognised that lignite stored in stockpiles will still have the potential to generate fugitive dust emissions as the lignite is being crushed in the mine and lignite loses its moisture when exposed to air, so it is likely to fragment and convert to small size. Dust from stackers/ reclaimers will be continuous;
- Drilling and blasting of limestone. The choice of blasting technique can affect dust generation. Dust suppression sprays will be used;
- Loading and crushing of limestone. Enclosed crushers will be used to prevent dust emissions. Limestone will be stored in silos and delivered to the TPP in enclosed trucks. Dust suppression sprays will also be used;
- Dust generation from mobile plant and traffic. Haul roads will be wetted using water trucks, particularly during dry weather periods. Major haul roads will also be paved/ tarmaced.

IFC guidelines require the use of fully enclosed transportation systems and covered stockpiles where necessary for coal storage, for example in areas of degraded airsheds. The current airshed is at risk of being degraded, as discussed in Section 4.5.2 above. It is understood that at the power plant, enclosed conveyors will be used for the transportation of lignite and limestone, dust suppression systems will be used for material offloading operations and enclosed systems will be used for the mixing and discharge of ash and gypsum, to meet IFC and indicative BAT requirements. Similarly, limestone will be crushed and stored in enclosed silos and transferred in enclosed trucks.

In light of the potentially degraded airshed and predicted impacts outlined in Section 4.5.9, design concepts for particulate abatement and dust suppression measures have been specified in the Dust Management Plan for all the different potential types of sources outlined above, in order to provide a measureable framework for minimising particulate impacts. Measures specified by EnerjiSA to be implemented by the appointed mining contractor include:

- Use of minimal/ variable drop height conveyors and transfer points to minimise wind-blown dust;
- Use of dust suppression sprays and wetting agents, as appropriate;
- Use of direct, enclosed continuous conveying systems;
- Use of abated extraction systems on enclosed storage and transfer operations;
- Surfacing of haul roads;
- Vehicle speed restrictions.

The Dust Management Plan also details the management systems, plans and personnel responsible for monitoring and mitigating any dust impacts should they arise. It proposes ambient particulate (PM_{10}) monitoring in Yesilova and Yamanli together with monitoring of key weather conditions. Trigger levels for the implementation of additional mitigation measures are also outlined together with operating and complaints procedures.

4.5.7 Emissions of Heavy Metals

Heavy metal emissions only occur in potentially significant concentrations in the combustion flue gas. Potential emissions have been estimated and an assessment of potential impact has been made in the revised EIA, as discussed in Section 4.5.9.

4.5.8 Emissions of Ammonia

As outlined in the NOx control section above, the use of SNCR abatement systems can give rise to ammonia emissions to air – 'ammonia slip' arising from over-dosing of urea into the abatement system, causing some unreacted ammonia to be discharged to atmosphere. A conservative assessment has therefore been made in the revised EIA of potential impacts from ammonia emissions to air, resulting from use of the NOx abatement system, taking into consideration ammonia baseline levels, predicted ammonia emissions, as discussed in Section 4.5.9.

4.5.9 Assessment of Potential Impact

Emissions from the power plant

Once primary and secondary control measures have been applied to achieve appropriate emission limits, it is essential that the adequate dispersion of the residual emissions from the proposed plant is demonstrated, so as to not give rise to significant local or transboundary impacts on the environment.

Impacts on human health and ecological receptors have been assessed in the revised EIA, using new generation dispersion modelling and comparing predicted impacts with national and international ambient air quality standards. The assessment has considered potential impacts from emissions of NO_x, SO_2, PM_{10}, $PM_{2.5}$, NH_3 and heavy metals, using the proposed emission limits shown in Table 4.1 as well as appropriate emission factors for other species, taken from US EPA guidance document AP-42. For the operational phase of the Project, cumulative impacts of the power plant operation, lignite extraction and waste emplacement operations have been considered for PM_{10} and $PM_{2.5}$ emissions. For NO_x and SO_2, cumulative impacts with vehicle emissions have been considered. Emissions from plant start-up on fuel oil have also been assessed.

As discussed above, EnerjiSA has evaluated $PM_{2.5}$ emissions to air from the TPP based on an assumed fraction of particulate emissions from the power plant as $PM_{2.5}$. This is in recognition of the tightening international position on $PM_{2.5}$ emissions, for example the European Directive 2008/50/EC on ambient air quality for member states to control and minimise $PM_{2.5}$ to limit values specified therein, and equivalent regulations in the US. URS has provided additional information to assist in this assessment process.

The dispersion model AERMOD has been used, taking meteorological data from Sariz, 40 km north east of the project site, processed using AERMET, which is considered appropriate. Long term data was reviewed by the EIA consultant and the data from 2010 was considered to be the most appropriate for use in the assessment. A 20 km x 20 km grid has been used and while this does not give a refined grid in proximity of the project site (a grid spacing of 1 km has been used, whereas 200m may be more appropriate to assess near field impacts), separate discrete receptors have been used to represent the 6 closest settlements. Terrain data has also been applied as appropriate.

Historically, stacks of up to 200 m high have been used on larger coal-fired plant but this is unlikely to be required on a new build plant meeting current emission benchmarks and siting

the stack within the cooling tower as planned at TPP, since the buoyancy of the cooling tower thermal emission assists the buoyancy and hence dispersion of the stack gases. From the assessment completed in the revised EIA, predicted impacts of emissions from the power plant are not significant on the basis of a 158 m high release point at the top of the cooling tower; the proposed use of the cooling tower is therefore considered appropriate from an environmental impact perspective.

In summary therefore, the proposed Emission Limit Values and stack height for releases to air are considered by URS to be appropriate for the Project, since no exceedance of any EU or WHO air quality objective is predicted as a result of power plant emissions.

Particulate and dust emissions from the wider Project

As outlined in Section 4.5.6, there are multiple potential sources of dust and particulate emissions from the wider Project that have the potential to impact on local receptors. These have been assessed during the construction and operational phases of the Project. For the construction phase, the following potential emission sources were cumulatively assessed:

(1) excavation and loading in the power plant area;

(2) dumping in the top soil storage and permanent disposal areas.

The predicted worst case 24 hour and annual average PM_{10} concentrations arising from these operations at the sensitive receptors are 22 $\mu g/m^3$ and 12 $\mu g/m^3$ respectively, which are predicted at Yesilova.

These predicted impacts equate to around 44% and up to 60% of the WHO guidelines respectively, or 29% and 40% of the WHO interim target-3 guidelines (44% and 30% of the EU objectives), which fails to meet the IFC requirement that emissions from a single project should not contribute more than 25% of the applicable ambient air quality standard, to allow additional future sustainable development in the same airshed.

In addition, these impacts need to be added to the baseline, which is around 30 $\mu g/m^3$ as an annual average. For short term impacts, it is typically considered appropriate to add the predicted short term contribution from a Project to twice the annual average concentration, although this approach could be relaxed depending on the nature of the long term monitoring data and where it was taken. Should this standard approach be taken, the predicted cumulative short term and annual average impact of the combined project and baseline would be around 82 $\mu g/m^3$ and 34 $\mu g/m^3$ respectively. Both these exceed the relevant EU and WHO objectives and interim-3 target guidelines.

For Project operational impacts, stack emissions, traffic, mine and quarry operations were modelled simultaneously, although it was assumed that extracted lignite will have high moisture and closed conveyors will be used for transportation of lignite, therefore no dust emission were included from the lignite extraction and conveying to the stockpiles. Similarly, it was assumed that limestone operations will be fully enclosed, so no emissions will occur from the limestone quarry. In addition, there has been no apparent assessment of crushing operations, blending or conditioning operations or stockpile management or erosion. For PM_{10} and $PM_{2.5}$, the year 2020 was modelled, as the amount of excavation (soil stripping, overburden and interburden) and lignite extraction is predicted to peak in 2020.

The predicted worst case 24 hour and annual average PM_{10} concentrations arising from these operations at the sensitive receptors are 35 $\mu g/m^3$ and 9.6 $\mu g/m^3$ respectively, which are predicted at Yesilova.

These predicted impacts equate to around 70% and up to 48% of the WHO guidelines respectively, or 47% and 32% of the WHO interim target-3 guidelines (70% and 24% of the EU objectives), which fails to meet the IFC requirement that emissions from a single project should not contribute more than 25% of the applicable ambient air quality standard, to allow additional future sustainable development in the same airshed.

In addition, these impacts again need to be added to the baseline, which is around 30 µg/m^3 as an annual average. As discussed above, for short term impacts, it is typically considered appropriate to add the predicted short term contribution from a Project to twice the annual average concentration although this approach could be relaxed depending on the nature of the long term monitoring data and where it was taken. Should this standard approach be taken, the predicted cumulative short term and annual average impact of the combined project and baseline would be around 95 µg/m^3 and 40 µg/m^3 respectively. Both these would therefore exceed the relevant EU and WHO objectives and the interim-3 target guidelines.

It is fully recognised that the predicted impacts are based on conservative assessment of cumulative worst case impacts. Nevertheless, the predicted impacts appear to exclude several potential sources (notably the stockpiles) and yet are still identified as significant. In addition, the assessment does not consider potential deposition impacts and associated damage to crops, which is a concern specifically raised by the local community. Therefore the proposed mitigation measures have been outlined in the Dust Management Plan which will be used as a compliance tool to demonstrate that the Project can meet IFC requirements during construction and operation. As outlined in the Erosion and Sediment Control and a Landscaping and Reinstatement Plan, it is recognised that when the open mine becomes exposed to high winds or subjected to heavy traffic, wind erosion could take place. Therefore EnerjiSA recognises that appropriate dust control measures need to be undertaken including for example road sweeping, use of tyre washes and stabilisation of the roadways in high usage locations. Such information is provided in the Dust Management Plan, together with a map of potential dust sources and details of proposed ambient dust monitoring at sensitive receptors.

4.6 Water use

A water balance (drawing 10014D-M-WB-001) has been provided by EnerjiSA outlining water abstraction from the mine and groundwater boreholes, water use in the power plant and associated operations (e.g. cooling, boiler feed, FGD plant and ash handling) and subsequent discharge of wastewater from the power plant for use in ancillary operations.

The water balance includes elements for storage and treatment of raw water, effluent treatment and storage, and storm water storage as back-up supply to ash treatment. The Mining Development Plan details the water volumes expected to be generated from the mine dewatering operations. Some groundwater monitoring has been undertaken between 2007 and 2009 and in 2011, but as indicated in the Mining Development Plan the data is variable and long term sampling is required in the future.

The main areas of water use at the Project are:

- FGD plant;
- Cooling tower peak coolers;
- Boiler feedwater;
- Ash handling;
- Dust suppression.

The intention of the plant design is to utilise groundwater dewatered from the lignite mine as a raw water supply to the power plant via a raw water storage basin and to use the various plant effluent streams for ash handling and dust suppression, following appropriate wastewater treatment. Surface water run-off will also be collected in sedimentation basins and used for dust suppression but no surface water abstraction is required or proposed for the Project. In this way, it is proposed that there is zero direct discharge of effluent from the Project as a whole, since the TPP effluent discharge is in effect to be treated and discharged through the mining and residue handling operations – see Section 4.7.

It is understood that the TPP will require up to 330 m^3/hr during full operation and up to 400 m^3/hr during peak construction periods, although data from the Vattenfall mining report indicates that initially only 3,000 m^3/d (125 m^3/hr) of groundwater will be extracted from the mine, rising to 7,000 m^3/d (around 300 m^3/hr) in later years of mine operation. This therefore appears to be insufficient to meet the TPP total demand in isolation. However, to provide a continuous, reliable quantity of water to the TPP it is understood that groundwater borehole abstraction permits are to be obtained from the vicinity of the power station site to supplement the dewatering supply from the mine.

As outlined in the revised EIA, seven groundwater abstraction boreholes are to be developed in three basins – Buyukfirat Mountain, Kayircik and Koroglu Mountain. The boreholes are to be developed to a depth of around 200 m. A further eight boreholes could be developed if required to supplement water availability. The permission to develop the boreholes is obtained from the Directorate of State Hydraulic Works (DSI). In the granting of an abstraction permit, the DSI takes into account present groundwater use in the area together with the locations of existing abstraction wells. According to the Adana Governorship (2009) there is 14 million m^3/year of available groundwater in the Adana Tufanbeyli district, and at present around 1 million m^3/year is being utilised. There is therefore considered to be sufficient capacity in the groundwater resource to accommodate the needs of the Project. At this stage no information is available on the proposed abstraction volumes/ limits for each individual borehole, since this decision is made by DSI at the permitting stage in order to not impact on existing users.

In principle, provided that the potential environmental effects of this planned additional abstraction are appropriately assessed at the permitting stage, URS agrees with the strategy of providing alternative groundwater supplies to TPP in order to meet demand.

4.7 Effluent Emissions

4.7.1 TPP Water Balance and Effluent sources

It is proposed that through the water balance discussed in Section 4.6, there will be no direct discharge of effluent from TPP to receiving waters during normal operation, although there will be indirect discharge to ground through dust suppression and ash and gypsum slurry waste disposal. There will also be some water losses in the flue gas from the FGD plant, which will be vented to atmosphere as water vapour.

In particular, the proposed natural draught cooling tower design utilising indirect dry cooling avoids thermal effluent discharges to receiving waters. This is a positive environmental design approach and meets BAT and IFC requirements to prevent/ minimise pollutant discharges (including thermal effluent) to controlled waters.

A wastewater storage basin will be installed and used to collect boiler blowdown and effluent from water treatment plant backwash as well as regeneration of the demineralization plant.

The main components of the proposed wastewater treatment system are:

- Oily waste water storage basin
- Oil separator
- Wastewater storage basin
- pH adjustment basin
- Reaction basin
- Flocculation basin
- Sedimentation basin
- Neutralization basin
- Reuse basin
- Sludge treatment system
- Chemical storage and dosing system
- Pumps
- Connection piping
- Control and instruments
- Domestic Waste Water (Sewage) Treatment Package

The plant will be designed to operate automatically and will be controlled and monitored by PLC. There will be no effluent streams that can bypass the wastewater treatment system.

Surface water runoff from construction sites (mainly TPP construction area) will be collected through drainage systems that will be established around these sites and directed to settlement/ sedimentation basins. No direct effluent discharge from the basins is planned; the water will be used for dust suppression.

Wastewater from concrete batching operations during plant construction (from aggregate washing, batching concrete, etc.) will be reused for the same purpose after pre-treatment in a settlement pond. The settlement pond will provide physical treatment for the wastewater originating from washing aggregate. The outlet pH level will be monitored and if the pH is high, neutralization with acid will be implemented.

Domestic wastewater to be generated during the construction and operation phases of the TPP and operation of the mine will be treated at separate package treatment plants to be constructed at the TPP site and within the mine field, in compliance with the related Turkish Regulations (Turkish Water Pollution Control Regulation, and Regulation on Water Products).

Both industrial and domestic wastewaters will be treated to meet IFC standards as well as provisions of the Turkish Water Pollution Control Regulation (Official Gazette; Date: December 31, 2004; No.25687), which set allowable discharge limits for wastewaters to be discharged into the environment. Treated water will therefore meet the discharge limits outlined in Table 4.2. This table meets the requirements outlined in the IFC guidance or Thermal Power Plants and the wastewater treatment plant will be designed to meet these limits prior to the water being reused within the wider Project.

Table 4.2 Wastewater Discharge Limits

Parameter	Discharge Limits	
	2 hr- Composite Sample	24 hr Composite Sample
pH	6-9	6-9
COD (mg/l)	40	30
Total suspended solid (mg/l)	50	50
Total cyanide CN^- (mg/l)	-	0.5
Sulphate (mg/l)	3,000	2,500
Chloride (mg/l)	2,000	1,500
Free residual chlorine (mg/l)	0.2	-
Oil and grease (mg/l)	10	10
Total Chromium	0.5	
Copper	0.5	
Lead	0.5	
Cadmium	0.1	
Mercury	0.005	
Arsenic	0.5	
Zinc (mg/l)	1.0	-
Fluoride (mg/l)	-	30*
Total iron (mg/l)	1.0	-
Total phosphorus (mg/l)	2	-
Temperature (℃)	35	30
Settleable solids (mg/l)	0.3 (grab sample)	-
	5 (grab sample)	-
Fish biomass test for toxicity (TDF)	10	-

** discharge criteria after treatment of acid pickling wastes*

Monitoring of treated wastewater will be carried out at the discharge point of the wastewater treatment plant, in the treated water pond, the ash and gypsum mixer, the stormwater reservoir and the domestic wastewater treatment plant outlet according to the criteria presented in Table 4.2. As outlined in the Water Monitoring Plan, monitoring will be carried out on a continuous basis supplemented by monthly grab sampling and laboratory analysis. There will also be temperature and flow measurements on the effluent lines, upstream and downstream of waste water treatment plant.

The treated effluent from the wastewater treatment system will be directed to a treated water pond for use in residue handling or dust suppression as appropriate.

There is the potential for an increase of the mine water volume from the opencast mine drainage system during periods of heavy rainfall. If the volumes exceed the capacity of the TPP wastewater treatment plant the excess water will have to be discharged from the sedimentation tank directly to the Sariz River. However, groundwater will not be fed directly to the Sariz River; only excess stormwater will be discharged in this way, which will therefore predominantly be rain water.

4.7.2 Mine Dewatering

As a result of the proposed design, initially it was considered that no discharge permits would be required for the entire Project operations. However, a discharge permit will be required for discharging mine dewatering to the River Sariz during the eight month period prior to mine

operation plus the period of TPP construction. It is understood that alternative uses for the dewatering effluent will also be explored, including during TPP construction and potentially as agricultural irrigation water.

Monitoring of surface water and groundwater quality has been undertaken by EnerjiSA. For surface water, the Magara Creek was monitored at two locations between October 2007 and July 2009. Further sampling was undertaken at two points in July 2011. The monitoring indicates low concentrations of heavy metals in the surface water, but elevated BOD, oils and greases and coliforms, associated with residential discharges.

Groundwater sampling has been undertaken from four locations in the vicinity of the lignite mine, including the following:

- Water analysis from springs and an observation well in the period between October 2007 and July 2009;
- Water analysis from springs and an observation well in the period in July 2011;
- Water analysis from drill holes in August 2011.

As with the surface water monitoring, the groundwater monitoring indicates low concentrations of heavy metals in the surface water, but elevated BOD, oils and greases and coliforms, associated with residential discharges.

On the basis of the initial monitoring results therefore, the discharge of dewatered groundwater from the mine into the river should not give rise to a change in water quality of the river. Therefore there appears to be minimal risk of the discharge permit not being granted on environmental grounds.

However, it was considered in the revised EIA that the available water quality data from the measurements conducted do not provide sufficiently reliable information for comparison of groundwater and Siraz River quality. Therefore, at the start of the dewatering process, it is proposed that additional samples would be taken and analyzed in order to determine whether there are any potential risks associated with mine dewatering effluent being discharged to the surface water. Prior to determination of the results and potential impact, it is proposed that alternative uses for the dewatering effluent for this period would be explored, including utilization during TPP construction and potentially as agricultural irrigation water.

IFC recommendations include preparation of a Sustainable Water Supply Management Plan to minimise impacts to natural systems and water users and to avoid depletion of aquifers. It is considered that this recommendation is being addressed through the proposed Water Monitoring and Wastewater Management Plans.

EnerjiSA corporate policy requires that a risk assessment be made to protect the health and safety of community members and livestock from construction materials laydown or plant storage areas outside an existing facility boundary. For this Project, the assessment should be extended to include and mitigate for potential emissions from the proposed construction village, including discharge of effluent and surface water run-off, whether within or outside the facility boundary.

Provided there are no effluent discharges from the Project other than initial mine dewatering, and provided that the limits outlined in Table 4.2 are met for the water prior to its reuse and discharge to the mine, It is considered that there will be no significant impact on water quality in the area arising from the Project and it would comply with IFC requirements.

4.7.3 Acid Mine Drainage (AMD)

There is a risk of Acid Mine Drainage (AMD) arising from the dumping and long term storage of overburden and during periods of high water run-off from the mine during its operation and post closure. AMD could affect both the operation of the TPP and the ability to meet discharge consents.

To understand this issue, EnerjiSA commissioned an AMD [ARD] leachate characterisation study, which is appended to the revised EIA. Leachate testing of clay and silt samples from the mine area was undertaken. The results of this testing are presented in the revised EIA and show elevated levels of sulphates and some heavy metals.

The study concluded that certain clays and clay with lignite could generate AMD in the proposed overburden waste storage area. Therefore, at the Project site, especially mine area and waste disposal sites as well as material storage areas, the study recommended that proper closure measures should be taken. If these areas are left without any rehabilitation, run-off and seepage from these areas would cause contamination of surface and groundwater.

The dumped waste overburden might be a potential source of AMD after closure of the mine and dump sites. Covering the waste disposal areas will minimize the potential for AMD.

The study concluded that the short term tests that were undertaken will not provide an understanding of potential long term leachate generation issues, and that kinetic tests should be conducted on the waste samples of black clay, brown clay, clay with lignite and bed ash in order to see the time related changes of pollutant concentrations in the leachate. This information could then be used in hydrogeological modelling to assess the associated potential environmental risks of overburden waste disposal at the site. It was also recommended that necessary storage requirements to prevent leakage of the waste leachate to ground and surface water bodies should be taken.

It is proposed that a monitoring programme will be conducted including during the operation and closure of the mine and associated overburden dumps, to allow investigation of any remedial works as required. This will include provision for surface water run-off and treatment, if required. This will need to be included with the proposed long term overburden leachate testing to develop an appropriate closure plan for the mine, to minimise the risk of formation and impact of AMD. The proposed monitoring and management measures should be formalised as part of the Residue Management Plan to be prepared by the mine operator.

4.8 Noise and Vibration Emissions

Potentially significant noise sources within the TPP include fans and pumps, generators, turbines, transformers, transport and handling/crushing of fuels, and steam systems. With the limestone quarry now part of the Project, there is also the potential for environmental noise and vibration effects from quarry blasting operations.

Potential noise sources should be mitigated in the first instance through appropriate siting of noise generating equipment or processes and minimising pipe and ducting noise by ensuring smooth fluid flow. Additional mitigation of noise emissions should then be applied by use of silencers, acoustic housing and isolators. Vibration effects from blasting operations are understood to be minimised through the use of best practice blasting techniques; the limestone quarry is also not close to any residential receptors.

EnerjiSA has commissioned a noise report for the TPP and a vibration assessment for the proposed limestone quarrying operations. A single-location baseline noise measurement survey, at the closest sensitive receptor (Yamanli village) was undertaken between 2007 and

2009. An additional baseline study was undertaken in July 2011 at three locations (the villages of Yamanli, Kayircik and Taspinar).

Noise levels are currently below the National RAMEN limits for day-time and night-time noise, although baseline results at Yamanli village show an exceedance of the daytime IFC guideline level of 55 dBA.

Performance noise guarantees stipulated for the operation of the TPP indicate compliance with IFC EHS guidelines. The EPC contract specifies the noise limits during construction and plant operation as outlined in Table 4.3:

Table 4.3: EPC Contract Noise Limits

Receptor	**Construction noise limit**	**Operational noise limit**		
	1 hr LAeq (dBA)	1 hr LAeq (dBA)		
	Daytime (7:00 – 19:00)	Daytime (7:00 – 19:00)	Evening (19:00 – 22:00)	Nighttime (22:00 – 07:00)
Nearest sensitive EIA receptor	70	55	45	45

Noise abatement measures should achieve either the limits presented above or a maximum increase in background levels of 3 dBA at the nearest off-site receptor (taken to be the plant boundary). This meets the IFC guidelines, although IFC does not distinguish a higher noise limit at residential receptors for construction activities.

Calculated noise levels during construction of the TPP are predicted to comply with IFC requirements of 55dBA at the residential properties with the exception of at Yamanli village as a worst case, in light of the fact that baseline level already exceeds the IFC guideline. However, impacts are not predicted to increase noise levels by more than 3 dBA, so the predicted impacts meet IFC requirements.

During operation of the mine and limestone quarries, there is the potential for noise generation from mobile plant, conveyors and crushing operations. The limestone quarrying activities also include blasting and truck loading operations.

A safety zone of at least 300 m will be enforced between any mining operations and residential properties. On the basis of this distance, noise modelling undertaken within the revised EIA indicates that the 55 dBA level will not be exceeded as a result of mine or quarrying operations. Similarly no significant impacts are predicted from the TPP.

In terms of potential vibration impacts from limestone blasting, a separate technical report on blasting and vibration impacts has been prepared. The main concern relates to the limestone permission IR71464 since this lies closest to the village of Yamanli. In fact, a part of the village falls within the licensed area of the limestone extraction permission. However, EnerjiSA has stated that blasting cannot be undertaken within 700 m of the village as this is the boundary of the operating permit/ production area. In practice, EnerjiSA propose to limit limestone extraction from this area to the far north west corner of the permission, furthest from the village of Yamanli and notwithin 1.5 km of the village.

An assessment has been undertaken on the potential structural damage and nuisance disturbance associated with blasting operations. No structural risks were identified in the study and predicted Peak Particle Velocities (PPV) at residential properties were also considered unlikely to give rise to disturbance at most receptors. However, elevated airblast overpressure and human perception of blasting were predicted at Yamanli village and the TPP.

In order to ensure that impacts of vibration caused by blasting activities are minimised, the blast pattern will use 89 mm blast-holes and 10 m high. Other blast pattern parameters such as benches 11 m deep blast-holes, 3 m burden, 3.5 m spacing, and 3 m stemming length will also be followed as required, based on the findings of the technical study. Blasting will only be undertaken during daytime and with prior notice given to local residents, in accordance with best practice. Therefore it is considered that the potential vibration impacts have been considered and will be managed and mitigated appropriately.

It is understood that a noise attenuation barrier will also be installed between the mine and the village of Yesilova, to further minimise noise levels from mine operations at this receptor.

In accordance with the Noise Control Plan formalised under the EMP, environmental noise levels at nearby settlements (Yamanli, Kayircik, Yesilova and Taspinar) will be monitored on a quarterly basis, supplemented by additional monitoring in the event of complaints being received. Vibration monitoring will be conducted in the villages of Yamanli, Kayircik and Taspinar during blasting operations. Monitoring will be the responsibility of the EHS Engineer. More stringent control and mitigation measures have been outlined in the event that defined trigger levels are exceeded at the sensitive receptors.

4.9 Oil Storage

Heavy and light fuel oil are proposed to be used for TPP plant start-up. Both will therefore be stored on site. It is proposed that capacity for up to three cold starts plus reserve will be held on site, which equates to approximately 1,000 m^3 of LFO and 1,500 m^3 of HFO. They will be stored in accordance with EN 51 603 Part 1, danger classification A III API 650.

Fuel oil storage will be in dedicated above ground storage tanks, with appropriate bunding including secondary containment to contain 110% of the tank volume and a separate wastewater handling/ drainage system directing any run-off water (rainfall from the storage areas) to an oil/water interceptor. Any oily wastes/wastewater would be sent for offsite disposal to a site licensed by Ministry of Environment and Urbanization via licensed by waste transporters. These measures are considered to meet IFC and indicative BAT requirements.

4.10 Transmission Lines

Two 380 kV transmission lines will be required from the Project to connect to the Turkish electrical grid at existing sub-stations at Elbistan and Yesilhisar, roughly east and west of the site at distances of approximately 77 km and 110 km respectively. It is understood that the Turkish Electricity Transmission Company TEİAŞ will be responsible for the construction and operation of the transmission lines, although they will be initially paid for by EnerjiSA.

TEİAŞ has determined the proposed route corridor for each transmission line based on balancing the following considerations:

- Topography (to prevent landslides and consider soil mechanics);
- Transportation access during construction and the operational maintenance phases;
- Angle of intersection to minimise the strain on the towers;

- Locations of settlements;
- Locations of Special Environmental Protection Areas;
- Locations of forestry lands;
- Locations of wetlands;
- Locations of Tourism Regions and Centres;
- Locations of Archeological and Natural Sites;
- Presence of agricultural lands;
- Presence of dams, weirs and irrigation areas;
- Presence of mines and mining permissions;
- Future connectivity to the transmission lines;
- Running routes in parallel to existing transmission lines where possible.

Within the potential transmission line corridor, the presence of the above are identified. An indicative route is then prepared taking into account these factors. In addition, the route survey contract of TEİAŞ also takes into consideration:

- The line will be as short as possible;
- Crossings of railroads, main roads, water channels, energy and communication lines, rivers, streams and valleys will be minimized;
- The route will avoid interference with airports, radar and radio stations;
- The route will not pass through poplar groves used as fields to grow poplar trees and areas that belong to the Agricultural Research Institute.

EnerjiSA is in discussions with TEİAŞ and has undertaken pre-EIA studies of the proposed route corridor for each transmission line, with a 5 km wide corridor assessed for potential impacts. During the pre-feasibility studies, residential areas, natural conservation reserves, forestry lands, archaeological sites and expropriated areas are investigated. However it is understood that TEİAŞ are responsible for selecting the routes and that EnerjiSA has no opportunity to propose alternatives; routes were determined by TEİAŞ in November 2011. The EIA procedure was undertaken in accordance with Turkish EIA Regulations. EIA application files have been submitted to the Ministry of Environment and Urbanization on 26th January 2012. Public participation meetings are poroposed to be held in March 2012 in Kayseri Yahyalı, Adana Tufanbeyli and Kahramanmaraş Göksun.

The signed Interconnection Agreement has been received from TEİAŞ on 26th July 2011 and the activities are being carried in accordance to the planned schedule. It is understood that TEİAŞ has defined the conditions of connection within the Interconnection Agreement following studies to confirm that the grid can accept the output of the Project.

In summary, the key points associated with the two routes are listed below.

4.10.1 Tufanbeyli to Yeshilisar (to the west of the TPP)

- This is a 120 km long transmission line (TL)

- It crosses areas of designated forest that will need permission to cross before construction can be started. IFC indicates that TL should be sited to avoid habitat loss especially woodland. It is understood that the length passing through forestry lands has been minimised, as it is recognised by TEİAŞ to be an important consideration;
- No works will be started until expropriation completed. 174,000 m^2 needs to be expropriated. As the ETLs are owned by TEİAŞ, land acquisition and expropriation are being conducted under their regulations. There is not considered to be a risk of delay as a result of the expropriation procedure. Under Turkish Expropriation Law, there exists an article for "urgent expropriation" and it is possible that the areas on which the TL is to be installed are subject to urgent expropriation. The decision as to whether TL installation constitutes "urgent expropriation" is under the authority of the TEİAŞ Group Directorate. In such circumstances where urgent expropriation will be implemented, the legal processes can be completed afterwards;
- The route has been modified to avoid the Zamanti river wetland;
- The survey area contains 5 archaeological sites, 4 of which are first degree (most important) and the closest of which is 0.9 km from the proposed transmission line route. It is understood that the Regional Directorate of Cultural Assets and Museums will have to give their consent about the proximity to archaeological sites under the EIA process;
- There are residents located underneath the proposed route, and others within 20-50m. Highly populated areas are avoided but there are many scattered houses in rural areas and the TLs may pass over these houses subject to meeting national standards for noise and EMF impacts for example. This meets Turkish regulations. IFC indicates that TLs should be sited to avoid being close to or above residences due to EMF risk and public perception and it is considered that this approach has been applied on the proposed route but avoiding every farmstead is not possible. Undergrounding of the lines has not been considered;
- The Turkish noise limit for construction of the towers is 70 dB(A); IFC recommends a limit of 55 dBA at residential properties. However, with receptors underneath the lines, the noise levels are predicted to reach 115 dB(A) at those receptors. No mitigation is indicated as the activities are short in duration (4-6 hours). It is therefore expected that the final EIA for the route will address this issue and mitigate noise impacts where possible;
- To date, no consideration of visual impacts has been undertaken. IFC indicates that this is a key aspect to consider. Public consultation will be made by TEİAŞ in EIA Public Participation meetings to be held in March 2012 at the two closest residential settlements; none has yet been held. The potentially affected population will be consulted at these meetings.

4.10.2 Tufanbeyli to Afsin Elbistan (to the east of the TPP)

- This is a 66 km long transmission line (TL)
- It crosses large areas of designated forest that will need permission to cross before construction can be started, as above;
- No works will be started until expropriation completed, as above. 51,000 m^2 needs to be expropriated;

- No wetlands are crossed by the TL;
- No archaeological sites were identified in the survey area;
- There are residents located underneath the proposed route, and others within 20-50m, as above. Undergrounding of the lines has not been considered;
- The Turkish noise limit for construction of the towers is 70 dB(A); IFC recommends a limit of 55 dBA at residential properties. However, with receptors underneath the lines, the noise levels are predicted to reach 115 dB(A) at those receptors. No mitigation is indicated as the activities are short in duration (4-6 hours), as above. It is therefore expected that the final EIA for the route will address this issue and mitigate noise impacts where possible;
- To date, no consideration of visual impacts has been undertaken, as above, with public consultation meetings planned for March 2012.

In summary therefore, the pre-EIAs have indicated that routes can be selected for both transmission lines that meet Turkish requirements and it is understood that route selection is the responsibility of TEİAŞ. There therefore appears to be no physical or permitting barrier to the development of the required transmission lines for the Project.

It is also apparent that the route selected has been modified by TEİAŞ to avoid the Zamanti wetland and that the route selection process considered environmental sensitivities. While it has not been possible to avoid every isolated farmstead on the routes, settlements have been avoided and the principles of the IFC guidance appear to have been adopted. Provided that appropriate public consultation is conducted in the affected areas and the concerns of the communities are addressed, and provided that any mitigation measures identified in the EIAs are implemented, the transmission line routes should meet IFC requirements.

It is understood that two existing medium voltage (35 kV) transmission lines will need to be diverted to facilitate development of the mine, with the lines expected be relocated by year 15 of mine operation. The lines run between Yamanli and Yesilova and between Yamanli and Kayircik. According to Turkish EIA Regulations, medium voltage transmission lines do not require an EIA to be prepared for their relocation and they can be carried out upon approval of the relevant electricity distribution company. The alternative routes will be selected through collaboration between EnerjiSA and the electricity distribution company in the region. No permitting or environmental issues have been identified in this proposed relocation.

4.11 Permits

Permits for the project are being obtained on a rolling programme.

While not seen as a project risk by EnerjiSA, there is the risk of delay or challenge to the granting of all the necessary permits, which would delay project commissioning. However, EnerjiSA are confident that with the commencement of the construction phase, there will be no regulatory challenge to the project through outstanding permit applications; the operational permits are taken after COD.

EnerjiSA has prepared a list of permits that will be required, who will be applying for them and a timeline for application. This is reproduced in Appendix 3. Permits will need to be checked by the legal team.

From an environmental perspective, the following key permits will be required among others prior to operation of TPP:

- EIA Affirmative Approval from the Ministry of Environment and Forestry (already obtained for the original 300 MW scheme plus 450 MW Addendum);
- EIA Approval for the transmission lines from the Ministry of Environment and Forestry/Provincial Directorate of Environment;
- Environmental Permit from the Ministry of Environment and Forestry/Provincial Directorate of Environment;
- Construction Permit from the Adana Local Government;
- Building Permit from the Adana Local Government;
- Mining Permit from MIGEM;
- Groundwater and surface water abstraction permits from the State Hydraulic Affairs General Directorate (DSI) / Ministry of Finance, Real Estate General Directorate.

EnerjiSA has identified the permits and licences required and has indicated the timetable planned for their completion. URS broadly supports the strategy and timeline being proposed although recommends early dialogue with the regulators to minimise the risk of a permitting decision causing delay to the project.

4.12 Mining Master Plan

A Mining Master Plan has been drafted (by Vattenfall with support from IMC) and mining tender documents have been prepared. The successful contractor will prepare and submit the required detailed mining plan following their appointment.

The Mining Master Plan optimises the mining operations over the full mining period and the following environmental considerations have been addressed in the Plan:

- Permits and certification;
- Geotechnical design (slopes);
- Explosives and blasting management for limestone quarry operations (noise);
- Dust control, air quality monitoring and management;
- Hydrogeological aspects, including acid mine drainage management;
- Water, erosion and sediment/tailings management;
- Diversion of Demircik Creek;
- Ash disposal; and
- Mine environmental management.

Preparation of a Mining Master Plan is in accordance with IFC recommendations for preparation of a mining strategy plan to reduce environmental risk. The detailed mining plan will also maximise efficient use of resources consistent with the requirements under the Equator Principles, and maximise profitability of the mining operation.

4.13 Flood Risk

Under normal conditions there should be groundwater flow from the highly permeable alluvium into the Sariz River. However, springtime flood conditions could result in groundwater flow to the mine.

The potential for flooding of the Sariz River has been determined for 5, 10, 25, 50, and 100 year repeated floods. Measures for prevention of flooding of the mine from the river have been proposed as part of the Mining Master Plan, to include the installation of embankments, a slurry trench wall and dewatering drill holes at the mine side of the river.

The IFC recommendation is to ensure that permanent drainage can withstand 100 year-24 hour flooding events, and provision is made for stormwater settling facilities which are designed to be maintained and operated to provide a discharge water quality consistent with the receiving water. Through the flood management works proposed plus the use of stormwater collection and settlement ponds, it is considered that these requirements can be met on this Project.

The proposed monitoring of any discharges from the settlement ponds as outlined in the Water Monitoring Plan will be used to monitor ongoing compliance with IFC discharge limits.

4.14 Erosion and Change in Land Use

There is considerable land take associated with the Project – approximately 2,100 hectares of land of which more than 1,500 hectares are associated with the lignite mine and 300 hectares are associated with the limestone quarries. As a result of construction and mining activities, areas of irrigated land, dry farming, orchards and pasture lands will be removed – up to 80% of the land take is currently used for agricultural purposes.

In the long term, the reinstatement plans for the mine, dump sites and quarries will facilitate the recultivation of parts of the land at the end of the Project life in 30 years or more. The topsoil will be retained in stockpiles for subsequent re-use, and managed through a Topsoil Management Plan. However, the mining area cannot be fully re-established to the current situation due to the extraction of the lignite and the change in topography. Much of the land will therefore be restored for use as forestry land, recreation and grazing. A lake will also be formed.

As a result of construction activities, exposure of soils and alterations to slopes, there is an increased risk of erosion over baseline current levels. Consequently an Erosion and Sediment Control and a Landscaping and Reinstatement Plan has been prepared for the Project. According to the Plan, the key to erosion control is preventing the detachment of soil particles and reducing the volume of runoff. This is achieved through the use of practices such as minimizing land disturbing activities, minimising slope angles and maintaining vegetative covers or substituting for lack of growing vegetation by mulching or applying a compost blanket or erosion control mat. These measures will be implemented through the EMP.

It is recognised within the Plan that when the open mine becomes exposed to high winds or subjected to heavy traffic, wind erosion could take place. Therefore appropriate dust control measures need to be undertaken including for example road sweeping, use of tyre washes and stabilisation of the roadways in high usage locations. These are outlined in the Dust Management Plan.

It is considered that erosion management and reinstatement of land are being adequately addressed through the implementation of the management plans listed above.

4.15 River Diversion

It is understood that a 750 m long diversion of the Sariz River is proposed by 2031. In addition, the Demircik Creek in the southern part of the mining field is likely to be diverted by the year 2015 over a distance of 1,700 m, to take the creek out of the mining area. No other creek diversion is proposed even though the mine area is a collection point of surface waters coming from the neighbouring mountain ranges, especially in the rainy season.

The creek diversion will not change the overall flow of water through the region – which is used for irrigation - but will affect the local aquatic vegetation and organisms. This has been considered in the revised EIA and several mitigation measures are proposed in order to protect the aquatic species. In particular, no diversion works will be undertaken during the fish breeding season (April to June) and the creek will be monitored for changes in sedimentation build up, pH, dissolved oxygen and conductivity.

The creek has been surveyed so that the local ecology is known and can be maintained during the diversion works. Any works will be supervised by a hydrobiologist who will ensure that aquatic species will be protected during the diversion. In this way, the planned diversions should not give rise to significant environmental impacts.

4.16 Traffic

4.16.1 Existing Roads

Currently the Project site is connected to the nearest public highway (the Adana-Sivas Highway) on a road passing through Taspinar village. It is understood that contractor vehicles to the site will utilise this existing access road until a bypass is completed in 2012 – it is understood that the bypass is under construction and is currently undergoing paving and that the local communities have been consulted over this proposal. The bypass road will then be used for construction vehicle access over the duration of the construction phase of the Project.

In addition, there are two existing public roads crossing the mine – one connecting Yamanli and Yesilova, the other connecting Yamanli and Kayircik. Both these roads will be closed and ultimately will be replaced, as outlined below. All newly constructed and relocated roads within the Project area will be paved.

For the road from Yamanli to Yesilova, a temporary bypass will be constructed in 2012 along the western boundary of the Sariz River, running for 3.4 km. The works have already commenced. Upon completion of the mining works within the Additional Field, a new permanent road will be constructed, planned to be completed in 2023.

For the road from Yamanli to Kayircik, it is understood that this will remain open until 2017 at which point mining operations will have reached the road's location. The road will therefore be dismantled in 2017 and a replacement route will be developed running south of the mine, partly utilising the new road from Yamanli to Yesilova. This will add approximately 2 km to the length of the journey between the villages, which is currently 3.8 km. The original road will be reinstated (and improved) in 2023, after completion of the mining works within the Additional Field.

It is unclear whether the local community has been consulted over this proposal to date but it is understood that this will be communicated in the forthcoming public consultation for the Project.

4.16.2 Potential Traffic Movements associated with the Project

Traffic management and coordination will be the responsibility of the EPC contractor, as outlined in the EPC contract Annex 17. Traffic will be managed through the Environmental Management Plan (EMP).

Lignite will be transported by covered conveyor and will not impact on traffic flow on local roads. Limestone will be delivered to the TPP by tipper trucks using mine roads and not using the public highway. EnerjiSA states that traffic within the mine will be managed according to BAT under the EPC contract and no mine vehicles will need to access public roads.

The only expected impact of the project on a public road will be during the construction phase of the TPP, through which Adana-Sivas Highway will be utilized between 2012 and 2015.

In the revised EIA, in order to assess the potential impacts of the Project on the existing load on this Highway, current traffic volumes in the area were obtained from the Turkish General Directorate of State Highways. Then, the number of vehicles to be used for the construction of the Project was estimated and the change in the traffic load was considered.

The largest increase in traffic movements associated with the construction phase of the Project was observed in truck movements, with an increase of more than 75% over current levels predicted for 2012 and 2013. However, there is considered by the EIA authors to be spare capacity on the Adana-Sivas Highway and compared to other major highways within close vicinity of the Project area, the current truck load on this highway is quite low. Even when compared to other monitoring posts on the same highway, it was concluded that the load at Tufanbeyli Junction is considerably lower.

Therefore, the potential impact of the estimated 100 daily truck movements of the construction traffic in years 2012 and 2013 is considered by EnerjiSA and the EIA authors to still be within the carrying capacity of the highway, and the percentage increase is a product of the rather low existing traffic levels at Tufanbeyli Junction.

Air quality impacts associated with vehicle movements have been assessed as part of the cumulative air impact assessment – see Section 4.5.

4.17 Landscape and Visual Impacts

It is considered important for the public consultation exercise to be able to present to the local population the potential visual impacts and aspects of the Project. For the mine, much of the work will be below grade and therefore hidden from public view, but for the TPP, this will introduce a large industrial structure onto a previously agricultural/ rural landscape.

EnerjiSA has prepared a 3-D visualisation of the proposed power plant and undertaken a landscape and visual impact assessment as part of the revised EIA. The assessment concluded that the villages of Taspinar and Yamanli are most affected by the TPP development.

The revised EIA highlights that public acceptance of developments as well as post closure and reclamation plans is essential and should therefore be discussed throughout project development with relevant stakeholders. To date it is understood that no public consultation has yet been held on landscape and visual impacts, although wider public consultation is ongoing. To meet IFC requirements, landscape and visual impacts should be presented to stakeholders throughout Project development and it is recommended that this is undertaken as soon as possible. It is understood that this will be addressed through the brochure to be

presented to the public during community consultation meetings planned to be held in May 2012.

4.18 Closure and Post-Closure

Closure and post-closure aftercare, and beneficial future land use will be determined by EnerjiSA through multi-stakeholder consultation and incorporated into the restoration design at the earliest stages, in accordance with IFC guidelines. Provisions are being made for post-closure aftercare and monitoring of the physical site, pollutant emissions and potential impacts to be conducted for a minimum of five years and longer on a risk basis.

Outline proposals are presented in the EMP.

4.19 Environmental Management Plan and ongoing Monitoring

Ongoing compliance monitoring of emissions and impacts arising from plant construction and operation will be undertaken as part of the Project operation. The full project monitoring schedule and frequency has not yet been finalised but an indicative plan has been provided in the EMP attached to the revised EIA.

This plan will be finalised following appointment of the mining contractor and completion of the detailed management plans by the mining and EPC contractors. This will then enable the EMP to be used as a live compliance document and to facilitate third party auditing and inspection.

As outlined in IFC guidance, the EMP should:

- Identify corporate EHS policies that will be applied;
- Demonstrate senior management commitment;
- Demonstrate how continuous improvement will be sought;
- Demonstrate the resource and capability of environmental staff both on site and at a corporate level including the presence of adequate budget and manpower;
- Identify and summarise all anticipated significant adverse impacts from the Project;
- Describe – with technical details – proposed mitigation measures, including when they will be required, their design, description and any operating procedures;
- Provide linkages between different mitigation plans;
- Specify proposed monitoring parameters, locations, frequencies, limits of detection, trigger levels;
- Specify monitoring and reporting procedures;
- Provide details of ongoing consultation with stakeholders, as defined in a Public Consultation and Disclosure Plan.

The EMP and its associated monitoring plan will then be treated as live documents and subject to modifications in accordance with additional needs during the project life cycle.

Key management plans have been further developed to define proposed mitigation measures and monitoring methods and frequencies. These and the overarching EMP therefore provide a measurable framework and a clear commitment to ongoing environmental protection in accordance with the requirements of the IFC and Equator Principles.

5 Social Issues

5.1 Overview

This section presents the results of the social due diligence assessment of the proposed Tufanbeyli Power Plant and Coal & Limestone Quarries (TPP) project.

An overview of health and safety documentation relating both to site workers and the surrounding community has also been undertaken.

EnerjiSA is currently preparing the TPP project to comply with the requirements of not only Turkish legislation and guidance[1], but also those of the Equator Principles and IFC Performance Standards. Alignment with the Equator Principles and IFC Performance Standards is a prerequisite of financing by Equator Principles Financing Institutions (EPFIs).

Until January 2012, the socio-economic information about the TPP project affected area available for review was limited to a brief mention in the Adana-Tufanbeyli Power Plant EIA (March 2008) and a Public Opinion Survey carried out in the area in July 2008.

At the request of the CMLAs, EnerjiSA commissioned a Social Impact Assessment/ Resettlement Action Plan study[2] in September 2011. In addition, EnerjiSA appointed a local social expert with experience in hydropower and gas pipeline projects to strengthen their in-house environmental team in January 2012.

When baseline social surveys were undertaken in project affected villages in October 2011, project development was already well underway. The Project Office had been established in Tufanbeyli on 1st June 2011 as a focus of activity and information centre[3]; land had already been expropriated for the power plant site under the Energy Market Regulatory Agency (EMRA) procedures; the contract for the power plant had been awarded to a Japanese/Korean consortium (ITOCHU/SK Engineering & Construction) in March 2011; site preparation activities at the power plant site had been ongoing since August 2011; and EnerjiSA had purchased around 13% of the land required for the mine[4].

The TPP project is intended to last for 30 years and will employ up to 2,000 workers during the construction period (1,500 at the peak of power plant construction and 500 in the mine). A project of this scale will inevitably lead to socio-economic changes in the local area.

5.2 EnerjiSA Corporate Policies

Details of EnerjiSA's corporate approach to environmental and social (E&S) issues are presented in their policies and codes of practice[5]. The Environment Policy states that the company obeys the rules and requirements of current environmental legislation and codes of practice and fulfils all other level requirements that it subscribes to commit.

[1] An 'EIA Positive' decision was granted in 2006 with a further 'EIA Not Required' decisions for the project in 2008
[2] SRM (2012) *Tufanbeyli Thermal Power Plant Livelihood Restoration Plan - Final Report* (March 2012)
[3] The Project Office is staffed by the construction manager, topographers, secretaries and other employees. The Project Office is open on a daily basis for 'willing buyer/willing seller' land transactions, project-related comments and complaints, employment enquiries, etc.
[4] Note that the first area to be developed for the mine is the southernmost portion. Land acquisition activities are currently focussed in that area. Land acquisition of the whole mine area is scheduled to be completed by March 2015
[5] https://www.EnerjiSA.com.tr/en-US/Corporate/EnerjiSA/Pages/Policies.aspx

Health & Safety Policy

The Occupational Health and Safety (OHS) Policy states that EnerjiSA:

- *Is committed to achieve a healthy and safe working environment for its employees. Therefore, effectively implements OHS systems at its workplaces and throughout its professional activities as well as in the daily life;*
- *Aims not only to comply with the applicable legal requirements but also to continuously improve its safety management performance. This includes a systematic approach towards the identification of all OHS risks and the allocation of adequate resources to avoid or control such risks;*
- *Believes that effective implementation of OHS can be only realised through collective effort and support by all members of the organisation. Thus OHS practices are the responsibility of all employees and a part of the organisational culture;*
- *Accords health and safety to its high priority, with the OHS Policy being guided and efficiently supported by the EnerjiSA executives;*
- *Spreads OHS awareness among its suppliers by enforcing them to raise their safety standards in goods and services they provide to fulfil our requirements.*

Social Codes of Practice

EnerjiSA's Codes of Practice outline principles for project selection and implementation which state that:

- *In selection of the projects, it (EnerjiSA) pays strict attention not to create any adverse social impacts and to this effect, it develops projects which will provide for positive social interactions;*
- *It creates priority to projects that will create employment in the region;*
- *It performs Social Responsibility activities within the framework of the resettlement plans in order to make a positive contribution in the socio-cultural environment;*
- *It always acts in a sensitive and responsible manner against the society and the environment that it lives in;*
- *High priority is attached to employment of the local people during both the construction and the operation stages;*
- *Special projects are developed for social development of the regions where its activities are conducted. The remarks and recommendations of the local people and the Non-Governmental Organisations about the project-related activities are obtained and considered duly.*

5.3 EnerjiSA Environmental and Social (E&S) Requirements

EnerjiSA's Statement of Environmental & Social (E&S) Requirements outlines the requirement for a contractor to establish an E&S Management System to ensure that requirements of the EIA[6], ESMP and Resettlement Action Plan (RAP)/Livelihood Restoration Plan (LRP) are met. The E&S Requirements are the standard terms and conditions relating to social matters with

[6] This refers to the EIAA approved by the Ministry of Environment and Forestry approved in 2006 and 2008

which EnerjiSA's contractors are contractually obliged to comply: a copy of the relevant EIA, RAP/LRP, ESMP and E&S Requirements is appended to the contract document.[7]

A copy of the E&S Requirements for the Tufanbeyli Power Plant has been reviewed. The contents cover: general E&S principles; (site) reinstatement and ecology; waste management; pollution prevention; traffic management; social management (i.e. media communication, complaints, worker's code of conduct, community safety, infrastructure damage/disruption); land management (i.e. temporary/permanent land acquisition outside the project boundary); employment and procurement.

E&S Management Manual

The E&S Management System is to comprise an E&S Management Manual with supporting Plans which is to be submitted to EnerjiSA for review and approval. In relation to social and community matters, the Manual is to include descriptions of:

- Key Performance indicators to cover local employment and community complaints;
- How appropriately experienced and qualified personnel will be employed in the role of Contractor's E&S representative(s) and/or on-site inspectors;
- Workforce training to ensure that all personnel are aware of their E&S responsibilities;
- E&S records including employment records, procurement spend by location records and community complaints register.

Training Programme

The Contractor is to develop an E&S training programme which will include an initial site induction programme for all site personnel prior to carrying out any work(s) on site. The programme is to include the procedures for responding to the media, to unauthorised visitors to the site, and enquiries from the public.

Social Management Plan

EnerjiSA has advised that a finalised copy of the TPP Livelihoods Restoration Plan (reviewed later in this report) will be shared with the Contractor and a briefing given to the Contractor about EnerjiSA's social commitments. This will enable the Contractor to prepare a Social Management Plan (SMP) in line with the ESMS which is to be submitted to EnerjiSA for review and approval.

The Contractor's social management activities are to be governed by the following principles:

- Providing settlements affected by the Project with regular information on works progress;
- Identifying any significant new issues and manage any disputes;
- Monitoring mitigation measures and revise them when necessary;
- Maintaining constructive relationships with settlements;
- Maintaining awareness of safety issues among nearby settlements.

The Contractor's SMP is to include the following issues: complaints management; community safety; planned or unplanned infrastructure damage or disruption; local employment and local procurement.

[7] Questions from IFC Workshop, 6 February 2012

A Worker's Code of Conduct is to be adhered to which encourages respect for local residents and customs, restricts access to camp and works sites by non-authorised personnel and prohibits bribery, hunting and fishing, illegal trade in alcohol, drug use and the use of personal vehicles for works business.

A risk assessment for works outside the site boundaries (including traffic through villages) is to be undertaken to determine any necessary mitigation measures to ensure safety of the local community and livestock. A Traffic Management Plan is required which stipulates the need for: restrictions on vehicle speed, routes and times of travel; provision of road safety information for schools and avoidance of traffic during school rush hours; provision of advance information to communities on road diversions/temporary closures.

Contractor activities are not to adversely affect the power and water resources used by the local community; alternative power and water resources must be developed by the Contractor if necessary.

The Contractor must inform affected communities (via EnerjiSA) in advance of any planned disruption to utilities or other infrastructure (including water sources for livestock)[8]. Unplanned disruption or damage must be remediated as soon as possible.

Local Employment

The E&S Requirements stipulate employment to promote employment of workers from the local community. The Contractor's SMP is to include an Employee Policy which covers:

- Commitments to pay and conditions, collective bargaining, working hours (and payment of overtime), wage levels, maternity leave, etc. in accordance with Turkish regulations and relevant international standards (e.g. International Labour Organisation conventions);
- Drugs and alcohol policy;
- Disciplinary procedures.

All employees are to have written contracts giving details of: job description, hours, working conditions, wage levels (normal and overtime), rules including drugs and alcohol policy, disciplinary procedures and conditions of dismissal.

Local Procurement

The E&S Requirements stipulate procedures to encourage procurement of goods and services from the local area. The Contractor's SMP is to include a Local Procurement Policy which covers:

- Contracting principles on how Contractor will maximise local procurement, subject to appropriate quality and price;
- Mechanisms on by which preferential contracting will be achieved;
- Procedures to ensure that selection of suppliers is transparent;
- Targets for local supply at the district and provincial level.

[8] The Contractor will not inform the community without contacting EnerjiSA first: 'Contractor will inform potentially affected settlements via the EnerjiSA social team representative of the date, time and duration of the disruption and of alternative supplies (if provided) more than 3 days in advance'.

5.4 EnerjiSA Environmental and Management System (ESMS)/Contractor E&S Assurance and Monitoring Plan

The purpose of the ESMS/Contractor E&S Assurance and Monitoring Plan is to 'describe how EnerjiSA will ensure that E&S commitments, Turkish legal requirements and IFC standards are met during the construction and transition to operations of all its new building Projects'.

The document describes the following;

- ESMS: relevant policies, codes of practice and standards;
- Responsibilities: EnerjiSA's Environmental and H&S Group, Centre Environmental Engineer, Project Social Scientist and Site EHS Engineer;
- E&S Assurance Management: Commitments Register; Permits Tracker; Review of Contractor Documents; Training Requirements for EnerjiSA and Contractor (including E&S Induction, Waste management, Pollution prevention, Social management); Monitoring; Non-Compliance and Positive Performance; Stop Work; Incidents; Action Tracking; Assurance and Monitoring Tools; Progress Meetings; Budgeting;
- Reporting: Weekly and monthly reports to be provided by Contractor to EnerjiSA's E&S Field Advisors, e.g. complaints and/or requests to Contractor and actions taken; results of environmental monitoring; E&S training; employment data; procurement data; work accident data; health statistics;
- Records: e.g. all permits; all monitoring results; Contractor E&S documents; Minutes of stakeholder meetings relating to E&S issues; Training records; Grievance registers;
- Community Relations: roles of Contractor, EnerjiSA's social team and their representatives at local level (Administration Chief and/or Communication Officer); community meetings; Grievance Mechanism.

A summary of incident and non-compliance reporting requirements is attached.

As mentioned above, a Statement of E&S Requirements (SoR) is attached to construction tenders and contracts in order to specify to the Contractor what is required of them to ensure that the Project E&S standards are met.

5.5 Relevant Standards

Based on the information available for the due diligence assessment, the following IFC Performance Standards (PS) are considered applicable in relation to the management of the project's current and anticipated social risks:

- PS1: Assessment and Management of Environmental and Social Risks;
- PS2: Labour and Working Conditions;
- PS4: Community Health, Safety and Security;
- PS5: Land Acquisition and Involuntary Resettlement.

Of remaining Performance Standards: PS3: Resource Efficiency and Pollution Prevention and PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources are being covered under the environmental due diligence; PS7: Indigenous Peoples is not

applicable as there are no indigenous peoples in the project area; PS8: Cultural Heritage is covered in the 'Chance Finds' section of the Environmental Management Plan (EMP).

In relation to the Equator Principles (EP), the following are or will become relevant as the project is developed and implemented:

- EP1: Review and Categorisation;
- EP2: Social and Environmental Assessment;
- EP3: Applicable Social and Environmental Standards;
- EP4: Action and Management System;
- EP5: Consultation and Disclosure;
- EP6: Grievance Mechanism;
- EP7: Independent Review;
- EP8: Covenants;
- EP9: Independent Monitoring and Reporting;
- EP10: EPFI Reporting.

5.6 Background Material

Up until January 2012, little documented information on the socio-economic context of the TPP project affected area was available for review:

- Adana-Tufanbeyli Power Plant EIA (March 2008) briefly referred to local and regional income generation through job creation (500 during construction and 400 during operation), provision of accommodation, equipment leasing, purchase of fuel and 'services to be obtained from local shops'.

  The construction and operational phase impacts on local educational services, health services and technical infrastructure services (fire fighting, water supply, transportation and telephones) were mentioned together with the potential for generating local taxes.

  The original EIA does not contain any obvious reference to stakeholder engagement (e.g. meetings with government authorities, local communities;

- Public Opinion Survey by Sabanci University[9] undertaken in July 2008. This survey presented the results of a total of 869 interviews: 266 in Tufanbeyli; 285 in the (unnamed) target villages; 318 in villages in other parts of the sub-province. As the location of the interviews and the characteristics of the interviewees (e.g. age, gender, education) are not specified, the conclusions of the survey are of limited value;

- EnerjiSA's Statement of E&S Requirements, relevant details of which are outlined in Section 5.3 above;

- Corporate Standard Operating Procedures, e.g. complaints procedures;

- Corporate Grievance Procedures.

[9] Sabanci University was established by the Sabanci Group in 1999

5.7 Tufanbeyli Environmental Impact Assessment

As discussed elsewhere in this report, EnerjiSA engaged Encon to prepare a revised EIA[10] for the TPP project which was issued for review in January 2012. A number of revisions have subsequently been issued.

Socio-Economic Environment

Based on the Sabanci University study, the project area is described as being surrounded by settlements with people having lower education levels and higher education rates. The wider Tufanbeyli region is characterised as having a high tendency to migrate, insufficient health and social services, high social insecurity and 'inadequate civil consciousness'.

In relation to socio-economic issues, the EIA refers to the social impact assessment (SRM survey) which was being undertaken as a parallel study and only considers impacts on the transportation network, landscape and cultural heritage. Environment-related concerns raised by communities in the SRM survey included: noise, particularly blasting at the limestone quarry; air pollution; health impacts; safety concerns for the community and site workers.

The EIA does not contain any obvious reference to stakeholder engagement (e.g. meetings with government authorities, local communities).

Staff Requirement

The TPP site works and mining operations will require personnel with various types of expertise during different phases of the project. At the peak of the TPP construction phase, an estimated 2,500 people will be working on site. These workers will include engineers, boiler and turbine constructors and assembly workers, carpenters, construction workers, electricians, welders and unqualified workers. The EIA states that local people will be preferentially hired for these positions.

The TPP will be operated according to TEIAS regulations. The 24 hour per day, 365 day per year basis will involve four shifts, each with a minimum of 12 technical people. TPP site operators will be mechanical, electrical or chemistry technicians with a minimum educational level of a technical high school degree. In addition to the technicians, 210 people will be employed for operation and maintenance activities.

Mining operation will also be on a 24 hour per day, 365 day per year basis but with personnel working three shifts. Limestone quarries will be operated using one shift per day. At the end of the first 12 year operation (i.e. 2025), an estimated 690 workers will be required for all production processes within the minefield and limestone quarry. This includes 14 managers, 33 engineers, 59 foremen, 492 skilled workers and 88 unskilled workers.[11]

Given that the area is sparsely populated, it is likely that a mining settlement will be established by the mine operator. The location of the mining settlement will depend on the mine contractor who has not yet been appointed. The EIA does not identify where this settlement might be located, or the potential environmental and social impacts associated with its establishment and operation. This will require clarification and assessment prior to the settlement being developed.

[10] Encon (2011) *Tufanbeyli Thermal Power Plant Project Environmental Impact Assessment* (December 2011)
[11] Mine Development Plan, January 2012

Health and Safety

The legal section of the revised EIA prepared by Encon lists both Turkish and international regulations, standards and guidelines relating to occupational health and safety (OHS) and, by extension, community health and safety. EnerjiSA's own Environmental and OHS policies are also mentioned.

The EIA states that a Health & Safety (H&S) Management Plan will be developed in accordance with related Turkey's labour law and relevant international standards. This plan includes: provision of on-site medical facilities; training of site teams in occupational health and first aid; personal protective equipment (PPE); signage. Fire management is highlighted: restrictions on smoking; provision of fire-fighting equipment; appointment of emergency teams (fire, first aid, communication of rescue) and fire drill training.

The EIA also contains an Emergency Response Action Plan (ERAP) as an appendix, which refers to fires, medical emergencies, disease outbreaks, rescue situations (missing persons, assistance at height, trapped victims, confined space entry); industrial disputes.[12]

A copy of the TPP Contractor's[13] HSE Plan was forwarded separately for review. The contents of the HSE Plan are presented in Table 5.1.

Table 5.1 TPP Contractor's HSE Plan (May 2011) - Contents

Section	Contents
1	Introduction
2	Applicable Standards and Regulation
3	HSE Policy
4	Organisation
5	Responsibilities
6	Reporting Requirement
7	Safety Induction and Training
8	Subcontractor Evaluation
9	Safety Information
10	Personal Protective Equipment
11	Good Housekeeping
12	Emergency Plan
13	Fire Prevention
14	Transportation
15	Security Arrangement
16	First Aid and Medical Services
17	Job Site Safety Inspections
18	Safety Incentive Scheme
19	Signs, Signals and Barricades
20	Safety and Security Committee Meeting
21	Method Statements
22	Pre-Job Discussion
23	Health Provision at Site
24	Welfare of Employees
25	Equipment Inspection
26	Work Permit System
27	Excavations, Trenching and Shoring
28	Welding, Cutting and Brazing
29	Piling Operations
30	Working Places, Ladders and Scaffolding
31	Hand Tools and Power Tools
32	Concrete, Concrete Forms and Shoring
33	Crane and Lifting Equipment

[13] SK Engineering & Construction Co Ltd

Section	Contents
34	Slings and Lifting Gear (Rigging)
35	Mechanical Equipment
36	Material Handling
37	Electricity
38	Risk Assessment
Attachment	Security and Security Committee; Basic Personal Protective Equipment; Equipment Inspection Record; Daily Job Site Inspection Report; Safety Management System Audit; Equipment Daily Operation Checklist
Appendix	Procedures: Safety Induction; Work Permit System; Security Arrangement; Medical and First Aid Arrangement; Emergency Arrangement; Safety and Basic Skill Training; Accident and Incident Reporting and Investigation; Chemical Handling; Material Handling

Environmental Management Plan

In addition to the H&S and ERAP, an outline Environmental Management Plan (EMP) for the project is presented which comprises:

- construction phase plans to minimise impacts on the local environment and community resources: erosion, landscape and sediment control; emissions and dust control; noise control; wastewater, solid waste and hazardous waste; wildlife; cultural and historical chance finds;
- operational phase plans to minimise impacts on the local environment and community resources include: erosion, landslide and sediment control; landscaping and top soil utilisation; emissions and dust control; noise control; wastewater management; solid waste, TPP residues and hazardous waste management; wildlife.

As discussed elsewhere in this due diligence report, this outline EMP will need to be developed by the contractors into an auditable document to be used as an effective monitoring and compliance tool.

5.8 Mining Development Plan

The Mine Development Plan (MDP) for Tufanbeyli Coal Mine and Limestone Quarries (January 2012)[14] states that:

For safety reasons, no residential settlements or waterways shall be allowed within a certain distance from the mine boundary. This means real estate property used so far for agricultural, pasture or other purposes will no longer be available for the former users. In general, a substantial effort on compensation for land and property will become necessary.

The MDP briefly mentions the social characteristics of the Tufanbeyli region (low education, high unemployment rate, low physical infrastructure, high tendency to migrate, insufficient health and social services, high poverty, high social insecurity and inadequate civil consciousness).

Focussing on Tufanbeyli, the report mentions housing conditions (construction and roofing materials), social life, electricity and water supply, sewage, telephones and business activity (mainly agricultural work with migration for temporary work).

Worker Qualifications

The report emphasises the complexity of mine operations and the expensive equipment being used. The minimum qualifications and years of experience required for key mine workers, from

[14] Vattenfall (2012) Mine Development Plan for Tufanbeyli Coal Mine and Limestone Quarries - Final Report (January 2012)

mining engineers to truck and bulldozer operators, are presented. Positions where a background in farming or forestry would be useful and unskilled work are also identified.

Health and Safety

The MDP states that mine/quarry H&S Plan should cover: H&S organisation, tasks, responsibilities and authorities; audit and inspection system; incentive and disciplinary system; training plan; permit to work procedure; electrical safety and isolation; machinery and equipment safety (maintenance and safety inspection plans); handling of explosives and hazardous materials; fire protection and rescue system; emergency action plan and prevention strategies; special instruction measures and guidelines for general workplace health and safety; OHS control measures and monitoring.

5.9 Tufanbeyli Livelihoods Restoration Plan

In September 2011, EnerjiSA engaged Social Risk Assessment (SRM) to prepare Land Acquisition and Resettlement Action Plan (LARAP)/ Social Impact Assessment in compliance with IFC Performance Standard 5: Land Acquisition and Involuntary Resettlement. The Tufanbeyli Thermal Power Plant Livelihood Restoration Plan (LRP) - Final Draft was issued for review in January 2012 and further revisions were made in February and March 2012.

EnerjiSA would not have been obliged to prepare and implement a livelihood restoration plan without the involvement of EPFIs in the Tufanbeyli project.

Legal Framework

The study takes into account Turkish law and practices, the requirements of the Equator Principles and the IFC Performance Standards, and EnerjiSA's own corporate policies.

The legal framework section lists the main Turkish laws and policies relating to land acquisition, expropriation and involuntary resettlement, including customary land rights, Treasury and village land, and restrictions on excessive sub-division of agricultural land. Land acquisition procedures followed by EnerjiSA for public land and private land are described. Private land may be directly purchased by EnerjiSA or expropriated by EMRA.

Economic Displacement

The expropriation decision for the TPP areas was given by EMRA on 12th May 2011 and the expropriation formalities were completed on 8th August 2011. TPP site preparation works commenced on 11th August 2011. At the time the LRP report was issued, around 13% of the mine had been acquired. Ongoing land acquisition is concentrated in the south of the coalfield, which will be developed during the first 15 years of mine preparation/operation. Coal extraction is due to commence in 2014. All land acquisition in the coalfield area is scheduled to be completed by early 2015.

Land acquisition for a project is involuntary when - as for the TPP project - project affected people or communities do not have the right to refuse land acquisition, resulting in displacement. Although EnerjiSA prefers to engage in 'willing buyer/willing seller' transactions, if negotiations fail, land will be expropriated by LMRA.

It is understood that no physical resettlement will be required as a result of project implementation. Displacement can be physical or, as in this case, economic. Economic displacement refers to an action that physically interrupts or eliminates people's access to productive assets without physically relocating the people themselves.

IFC Performance Standard 5 states that:

In addition to compensation for lost assets … economically displaced persons whose livelihoods are adversely affected will also be provided with opportunities to improve, or at least restore, their means of income-earning capacity, production levels, and standards of living … if circumstances prevent the client from providing land or similar resources … alternative income earning opportunities may be provided, such as credit facilities, training, cash, or employment opportunities. Cash compensation alone, however, is frequently insufficient to restore livelihoods.

The Livelihood Restoration Plan for the Tufanbeyli Project was developed on the basis of social impact assessment using primary data from:

- fieldwork surveys undertaken in October 2011 (questionnaires, interviews and focus group discussions);
- discussions with EnerjiSA relating to earlier stakeholder engagement (primarily relating to land acquisition) and the on-going land acquisition process.

Socio-Economic Profile

The LRP presents a socio-economic profile of the five project affected villages: Yamali, Kayarcik, Yesilova, Taspinar and Pinarlar. Mine development is the major socio-economic impact in the area, so the survey focussed on households (project affected persons or PAPs) that will be directly affected. A total of 247 households were interviewed: 70 in the TPP affected area and 177 in the mine affected area. The total population of the project area is around 2,100.

Topics discussed include: household demographics (education, employment, land use); household economic profile (sources of income, livestock, cultivation, income/expenditure); vulnerable groups (based on age, gender, poverty, land holding/use).

According to the survey, 95% of the population is unskilled and 85% of households are dependent on agriculture as a source of income and subsistence. Development of the mine will result in the loss of prime, naturally irrigated, farmland where the main cash crops are cultivated: almost all of Yamanli's agricultural land will be lost as a result of mining operations.

Three land-based vulnerable groups are identified:

(i) those Project Affected Households (PAHs) that have lost all or most of their arable land and had to share the compensation with a large group of titleholders, even though in practice they were the only cultivators;

(ii) PAHs that the households that lose all or most of their arable land and there is no additional land to replace their land loss;

(iii) PAHs who do not have the legal titles and therefore are “landless” officially, even though they cultivate the land and their income is based on agriculture.

It is understood that current land acquisition activities are concentrated in the southern part of the coal field, the first area to be exploited. Households cultivating land in other parts of the coalfield will be able to continue doing so, even after ownership has been transferred, until later phases of mine development (e.g. for another 10-15 years). Note that it will not be possible to transfer the land back to the original owners after coal has been extracted and land restored (e.g. for forestry and recreation) due to the complexity of land ownership in the area.

Focus discussions with young people and women in Kayarcik and Yesilova provide an insight into village life and concerns/expectations about the TPP project (e.g. access to employment, health concerns, impact of TPP on crop production).

LRP Action Plan

An Action Plan to minimise adverse potential adverse impacts on local communities is presented. The plan identifies the following issues: lack of skilled labour force; lack of employment opportunities in the project area; dormant economy with no opportunities for development; loss of land and loss of agricultural income; loss of fertile, irrigated land; livestock production; lack of knowledge on cash investment; discontent due to cash compensation; poor waste collection and lack of disposal facilities; lack of potable water; noise and dust; air pollution; health impacts; safety concerns for the community and for site workers; education; community building; inadequate road infrastructure.

The Action Plan in Table 5.2 outlines a range of practical actions to be taken by EnerjiSA to support project affected communities. The table is a condensed version of the Action Plan presented in the LRP.

Table 5.2 Livelihood Restoration Plan - Action Plan (adapted from LRP, March 2012)

Issues	Actions	Goal
Lack of skilled labour force	ACTIVITY: • Certified training course for machine operators, etc.	To create a skilled labour force in the local communities nearby the Project area that could be locally employed in any construction related projects in the future.
Lack of employment opportunities in the project area	ACTIVITY: • Identification of local workforce to be employed for the construction works according to their skill levels through village headmen.	Offer employment opportunities in the region for unskilled labour force and skilled labour force, if available.
Dormant economy with no economic opportunities for development	ACTIVITY: • Encouraging contractor to give priority to procure some food need and services from the local communities, if appropriate. • Providing consultancy service for improving technical and financial capacity of the existing cooperatives.	Foster entrepreneurial activities and pave the way to encourage income generation from non-agricultural sectors which is unfamiliar to the PAPs.
Loss of land, and loss of agricultural income	ACTIVITY: • Providing advice on alternative income generation activity (i.e. intensive farming) or improved farming and livestock techniques through trainings with the help of concerning experts • Providing advice on the availability of arable land in the Project vicinity. • Detail identification of PAPs for assessing the exact losses and devising compensation and income restoration mechanism during monitoring process.	To minimize the adverse impact of land loss, and to create alternative mechanism to ensure sustainable agricultural income for PAPs.
Loss of fertile, irrigated land	ACTIVITY: • Soil analysis. • Provide advice on alternative irrigation systems and monitoring the implementation in the following 3 years. • Additional support program for a larger number of volunteer affected farmers in the following 2 years after the implementation of trial program, and monitoring these farmers for the following 2 years.	To assess the local potential for drip irrigation and intensive farming to compensate for the loss of naturally irrigated land to avoid loss of PAPs income.
Livestock production	ACTIVITY: • Opening an access path to the grazing grounds of Kayarcik village. • Technical support for improving livestock activity. • Technical support for build a strategy to assess the local capacity for milk production and cooperate on assisting foundation dairy production facility.	To devise alternative income generation schemes via support for livestock production.
Lack of knowledge on cash investment	ACTIVITY:	To advise PAPs on investing cash to gain a

Issues	Actions	Goal
	• Arrangement of public information session on investment opportunities.	return similar to agricultural income from land in order to avoid falling into poverty.
Discontent due to cash compensations	ACTIVITY: • Making additional payment for compensating the difference between the land values of EMRA and EnerjiSA.	To assure fair compensation.
Poor waste collection and lack of disposal facilities	ACTIVITY: • Purchasing waste bins and organizing awareness raising activity.	To support public health.
Lack of potable water	ACTIVITY: • Improvement of the existing borehole to meet water for Taspinar village.	To support public health.
Noise and dust	ACTIVITY: • Compensating crop-based income loss, if any, due to dust during construction phase of the Project. • Regular announcement before major blasting activity.	To enhance PAPs ownership and satisfaction.
Deterioration of health	ACTIVITY: • Organizing a health check-up as baseline data. • Sharing the results of the health check-up.	To support public health.
Air pollution and environment	ACTIVITY: • Air pollution and land analysis. • Regular informing (sharing the results).	To enlighten public on environmental impact of the project.
Fear of safety	ACTIVITY: • Fencing the construction area and informing local people on the accessibility rules. • Safety training for employees undertaken by the subcontractor.	To encourage safe environment.
Education	ACTIVITY: • Supporting (building) new school in Kayarcik and Yamanli. • Distribution of school bags.	To foster education.
Community building	ACTIVITY: • Supporting local cultural activities. • Establishment of communal social areas.	To enhance community building.
Inadequate Road Infrastructure	ACTIVITY: • Construct a new road to bypass Taspinar village in order to minimize the impact of construction on the village. The new road will reduce the already existing traffic passing through the village. • Should there be any damage to the existing roads, the subcontractor is responsible for road repairs. • Improve the existing road infrastructure between Yamanli, Yesilova and Kayarcik Villages.	To improve road infrastructure.

As required by Equator Principle 6, a Grievance Mechanism for receipt and resolution of complaints and concerns of the local community relating to implementation of the LRP and environmental concerns is outlined.

Stakeholder Engagement

Information regarding stakeholder engagement/public consultation activities undertaken since 2004 is summarised in Table 5.3.

According to EnerjiSA[15], an Information Brochure/Community Pamphlet about the project is currently being prepared. EnerjiSA has confirmed that community meetings and interviews with local authorities will be held in May 2012 to inform local stakeholders about the results of the revised EIA and LRP, including the potential impacts and planned mitigation measures, and to consult with the public on the results of the two reports. Copies of the Executive Summaries of the revised EIA and LRP in the Turkish language will be kept in the Project Office (in Tufanbeyli and also in the local site office, once established) any interested party to review.

[15] Email 7 February 2012

Table 5.3 Implementation Schedule for Past and Future Public Consultation (from LRP, March 2012)

Project Phase	Public Consultation Activities	Issues Discussed	Responsibility/ Participants	Location	Approximate Date
Pre-Construction	Public Participatory Meeting (PPM) required for Turkish EIA procedure	Introducing the planned project to local stakeholders, receiving their concerns about the Project	Consulting company responsible for EIA, the previous Project Owner, the relevant local authorities and local people; particularly village headmen	Tufanbeyli	2004
	Initial site visit for community meetings	Introducing the planned project to the local community	EnerjiSA Project Engineer Local people of Yamanlı and Kayarcık villages	Yamanlı and Kayarcık villages	October 2006
	Face-to-face interview with Director of Yamanlı Primary School	Educational needs and EnerjiSA's potential support, introducing the Project	EnerjiSA Project Engineer Director of the Primary School in Yamanlı village	Yamanlı village	October 2006
	Face-to-face interview with local branch of Forestry Directorate	Introducing the Project	EnerjiSA Project Engineer Director of the Forestry Department	Tufanbeyli district	December 2006
	Community meetings	Informing local community about the planned project	EnerjiSA Project Engineer Local people of Yamanlı and Kayarcık villages	Yamanlı and Kayarcık villages	December 2006
	Public information meeting	Informing local stakeholders about the Project; and declaring the date of August 2007 as the planned start date of the Project	EnerjiSA Projects Director Veli Balat, Tufanbeyli Project Mine Engineer Mustafa Yorukoglu and Land Acquisition Team Manager Ömer Özer, Local authorities and the public	Tufanbeyli district	January 2007
	Community meetings	Informing on the ongoing process about the Project to the public	EnerjiSA Project Team, Land Acquisition Team	Tufanbeyli district, and the project surrounding villages	April, June, and August 2007
	Community meetings	Informing on the ongoing process about the Project to the public and receiving their concerns	EnerjiSA Project Team, Land Acquisition Team	The project surrounding villages	March 2008
	Individual interviews with land owners	Land appraisal and asset inventory	EnerjiSA land acquisition team and its contractor	Yamanlı, Kayarcık, Yeşilova, Taşpınar, Pınarlar villages	May 2008
Pre-Construction	Face-to-face meetings	Introducing EnerjiSA and	EnerjiSA CEOs and academician from	Tufanbeyli district	July 2008

Project Phase	Public Consultation Activities	Issues Discussed	Responsibility/ Participants	Location	Approximate Date
		Sabancı University and giving info about the social survey to be held	Sabancı University that held a social survey in Tufanbeyli		
	Public informing sessions during site visits for preliminary works	Informing about the current situation of the Project and receiving concerns of local people about the Project	EnerjiSA Project Team local community leaders (village headmen of Yamanli, Kayarcik and Yesilova villages) and local authorities (including gendarmerie)	Tufanbeyli Yamanlı, Kayarcık, Yeşilova villages	Throughout the first six months of 2009
	Public informing sessions during site visits for preliminary works	Informing about the current situation of the Project and receiving concerns of local people about the Project	EnerjiSA Project Team local community leaders (village headmen of Yamanli, Kayarcik and Yesilova villages) and local authorities (including gendarmerie)	Tufanbeyli Yamanlı, Kayarcık, Yeşilova villages	Throughout 2010
INVESTMENT DECISION WAS TAKEN IN NOVEMBER 2010					
Pre-Construction	Initial contact with governmental authorities after the investment decision was taken.	Introducing the Project to Mayor	Tufanbeyli Mayor Project Team (Ankara) Land Acquisition Team	Tufanbeyli	18 Jan.2011
	Public Participatory Meeting	Introducing of EnerjiSA's first land valuations and	Project Team (Ankara), Land Acquisition Team ,	Project surrounding	19 Jan 2011
	One-by-one interviews	Land acquisition	Project Team (Ankara), Land Acquisition Team Accessible landowners (directly affected persons) and Village headmen		From January 2011 onwards
	One-by-one interviews	Consulting with Village Headmen on concerns of local communities	Project Team (Ankara), Yamanli, Kayarcik and Yesilova Headmen	Yamanli, Kayarcik and Yesilova Villages	22 Apr 2011
	Public Participatory Meeting	Introducing of EnerjiSA's second land valuations and land rates	Project Team (Ankara), Land Acquisition Team , People of each village and Village headmen	Yamanli and Kayarcik Villages	9-10 May 2011
	One-by-one interviews	Land acquisition and Information about Due Diligence visit of Lender's Consultants	Land Acquisition Team Resident landowners Project Team and Yamanli, Kayarcik and Yesilova Villages Headmen	Tufanbeyli	June 2011
Pre-Construction	One-by-one interviews	Needs of settlements and	Project Team (Ankara),	Yamanli,	5th July 2011

Project Phase	Public Consultation Activities	Issues Discussed	Responsibility/ Participants	Location	Approximate Date
		possible social outreach activities	Village headmen of Yamanli, Kayarcik, Yesilova and Ackal villages	Kayarcik, Yesilova and Ackal villages	
Construction	Community meetings	Needs of settlements and possible social outreach activities	Project Team (Ankara), Project affected populations of Yamanli, Kayarcik and Yesilova	Yamanli, Kayarcik and Yesilova villages	8-10 August 2011
	Community meetings	Information about land expropriation process	Adana Vice-Governor Fikret Deniz, Tufanbeyli Sub-Governor Ersin Tepeli, and Tufanbeyli District head of Gendarmerie EnerjiSA Site Team and all the PAPs	Kayarcik Village	18th September 2011
	Public information meeting	Information about site works and social activities of EnerjiSA	Project Team (Ankara) Residents of Kayarcik villages, Teachers of Yamanli Primary School	Kayarcik and Yamanli villages	6th October 2011
	Public information meeting	Land expropriation procedure	EMRA experts, Tufanbeyli Sub-Governor (Ersin Tepeli), Project Team (Ankara) and all the PAPs	Kayarcik village	13th October 2011
	Depth interviews with accessible landowners (headmen and local governmental authority) for social baseline survey and impact assessment	Informing about the purpose of the social survey and receiving local people's concerns and expectations about the Project	Social Survey Team The interviewed local people	The project surrounding villages	October 2011
	Public meetings with indirectly affected local people for social baseline survey and impact assessment	Informing about the purpose of the social survey and receiving local people's concerns and expectations about the Project	Social Survey Team The interviewed local people	Yamanlı and Kayarcık villages	October 2011
	Information meeting	Introduction of Project and possible social support activities	Project Team and Taşpınar Headmen	Tufanbeyli	18 Nov 2011
	Information meeting	Brief Project information	Project Team and Yeşilova Villagers	Yeşilova village	22 Dec 2011
Construction	Interview with village	Continuous informing and	Project Team (Ankara),	Tufanbeyli district and	Throughout project

Project Phase	Public Consultation Activities	Issues Discussed	Responsibility/ Participants	Location	Approximate Date
	headmen, local governmental authority	consultation activity about the progress of the Project	Project Site Team	all project surrounding villages	cycle
	Public participation meetings	Informing about the transmission lines to the public and local authorities	Consulting company responsible for EIA of Transmission lines, TEIAS as the owner of the lines, and EnerjiSA	Kayseri, Adana and K.Maraş provinces	March 2012
	Community meetings and one-by-one interviews with local authorities	Consulting with the public and local stakeholders on the results of EIA and LRP reports	EnerjiSA Project Team Village headmen Local communities Local authorities	Tufanbeyli and the project surrounding villages	May 2012
	Regular public meetings, regular visits to local authorities and regular interviews with interest groups	Informing the local people and stakeholders about the ongoing project activities and receiving their concerns and expectations/complaints	Project Team (Ankara), Project Site Team *(Community Liaison Officer)* Construction Contractor	Tufanbeyli and the project surrounding villages	Throughout the construction stage, six monthly period
	Peer-to-peer interviews with local people	Informing the local people and stakeholders about the ongoing project activities and receiving their concerns and expectations/complaints	Project Team (Ankara), Project Site Team *(Community Liaison Officer)* Construction Contractor	Tufanbeyli and the project surrounding villages	Throughout the construction stage, when needed
	Continuous update of EnerjiSA's official web page for sharing results of project-specific works via reports, plans etc.	Results of the EIA and LRP Reports	Project Team (Ankara)	website	After completion of each project-specific work (pre-EIA, LRP, expert reports on environmental issues)
Operation	Regular public meetings, regular visits to local authorities and regular interviews with interest groups	Informing the local people and stakeholders about the ongoing project activities and receiving their concerns and expectations/complaints	Project Team (Ankara), Project Site Team *(Community Liaison Officer)*	Tufanbeyli and the project surrounding villages	Throughout the operation stage, once a year

LRP Monitoring Framework

The LRP report provides a Monitoring and Evaluation (M&E) Framework for internal monitoring, external (independent) monitoring and a LRP completion audit. Monitoring roles and reporting responsibilities are defined. Areas to be monitored are: efficiency and effectiveness of LRP implementation; restoration of living standards; community satisfaction; public consultation and grievance. As shown in Table 5.5, the LRP monitoring framework defines indicators and measures; monitoring frequency and duration; and the responsible parties.

Table 5.5 LRP Monitoring Framework (from LRP, March 2012)

Monitoring Area	Indicators and Measures	Monitoring Frequency	Duration	Responsible Parties of the Monitoring
Efficiency and Effectiveness of LRP	• Progress in signing land acquisition agreements – % complete. • Payment of compensation to right holders - % complete. • Number of title holders and parcels whose title deed transfer were completed by purchasing or expropriating lands - % within the total. • Amount of land acquired for construction - sqm in total. • Title deed registrations of contractor – number, % complete. • Defined and working grievance system– number of grievances lodged/closed out. • Public consultation process defined –log of activities, number of meetings held. • Monitoring process defined –responsible teams appointed.	Monthly or quarterly	From Land Acquisition to LRP Completion	EnerjiSA Field Representatives and Environmental & Social Group
Restoration of Living Standards	• Cash compensation to landowners – amount, number, % complete. • Cash compensation to other users – amount, number, % complete. • Compensation paid in line with agreed rates and time – number of payments, % in total. • Other losses (roads, irrigation channels, drains etc) of right owners compensated/restored – type and number of other compensations, % in total. • Occasions where special needs of vulnerable groups addressed – number and type of aid/support. • Following up health and safety regulations for EnerjiSA employees – number of trainings gives, number of grievance about health and safety • Changes occurred in income and expenditure patterns of PAPs before and after the project – amount or % of income increase.	Biannual (for the first three years in parallel to construction period) Annual (for the following year after the construction period	From Land Acquisition to Construction Completion	EnerjiSA Field Representatives and Environmental & Social Group Panel of Experts
Community Satisfaction	• Attitudes of PAPs to the land acquisition process – observation and feedback collected through interviews. • Attitudes of PAPs to the activities living standards restoration - observation and feedback collected through interviews. • Attitudes of PAPs to the activities of livelihood and income restoration - observation and feedback collected through interviews. • Attitudes of stakeholders to public consultation – observation and feedback collected through interviews.	Ongoing	From Land Acquisition to LRP Completion	EnerjiSA Field Representatives and Environmental & Social Group An independent Social Expert
Public Consultation	• Public consultation process defined –log of activities, number of meetings held, number	Ongoing	From Land Acquisition	EnerjiSA Community Liaisons and Social-

Monitoring Area	Indicators and Measures	Monitoring Frequency	Duration	Responsible Parties of the Monitoring
and Grievance	of participants of public meetings , visits to local authorities or other local stakeholders, frequency of visits to project-affected settlements, • Types of grievances – number of lodged and closed grievances and outcomes.		to LRP Completion	Environmental Unit An independent Social Expert

A Budget and Implementation Schedule for the LRP is also provided. Annexes comprise a list of references and citations, a copy of the household questionnaire and a summary of the focus group discussions.

5.10 Comparison with EP/IFC PS Requirements

A detailed comparison between the reports reviewed and the Equator Principles and relevant IFC Performance Standards is presented in Appendix 4. The results are summarised in the following paragraphs. Note that the requirements of EP/ IFC guidance should be complied with, except where the Turkish requirements are more stringent.

EP2: Social and Environmental Assessment

The TPP project development cycle had been underway for some time when the EPFIs became involved. Documentation regarding environmental and social aspects reviewed to date and the ongoing discussions indicate that EnerjiSA is working towards compliance with the Equator Principles and IFC Performance Standards.

This is demonstrated by their commissioning of a Social Impact Assessment/Resettlement Action Plan study and their appointment of a local social expert to strengthen the environmental project team. Given that no physical resettlement is required, the study commissioned (which focuses on livelihood restoration for economically displaced project affected persons) would not have been required without involvement of EPFIs in the project process.

The Livelihood Restoration Plan identifies potential positive and negative socio-economic impacts resulting from project development, primarily the loss of agricultural land. Practical means to minimise potential adverse impacts on local communities have been identified in the course of discussions between the local headmen, local project affected persons, the social survey team and EnerjiSA.

EP3: Applicable Social and Environmental Standards

IFC Performance Standards have been used to assess social and environmental impacts of the project. PS1 Assessment and Management of Societal Risks, PS2 Labour and Working Conditions, PS4 Community Health, Safety and Security and PS5 Land Acquisition and Involuntary Resettlement have been used to assess the social impacts of the project.

PS 3 & 6 are have been used to assess the environmental impacts of the project. PS7 is not applicable. PS8 is covered by a 'chance finds' category in the EMP.

EP4: Action Plan and Management System

The ESMS/Contractor E&S Assurance and Monitoring Plan (reviewed earlier) describes the roles, responsibilities and reporting systems required. In EnerjiSA's ESMS, the EMP and SMP are separate documents.

LRP Chapter 5: Project Benefits and Income Restoration identifies practical measures to be undertaken by EnerjiSA to address the economic displacement resulting from the TPP project. LRP Chapter 7: Monitoring and Auditing sets out a framework for internal and external (independent) monitoring of:

- Efficiency and effectiveness of LRP;
- Restoration of living standards;
- Community satisfaction;
- Public consultation and grievance.

As indicated earlier, the LRP will be shared with the Contractor and a briefing given to the Contractor about EnerjiSA's social commitments. This will enable the Contractor to prepare a SMP in line with the ESMS which is to be submitted to EnerjiSA for review and approval.

In accordance with best practice, the LRP M&E Framework defines monitorable (and auditable) indicators and measures; frequency of monitoring; duration of monitoring (i.e. project development phase); parties responsible for monitoring: EnerjiSA's Field Representative, Environmental & Social Group, an independent Social Expert and/or a Panel of Experts.

EP5: Consultation and Disclosure

The LRP contains details of the stakeholder engagement/public consultation that has been undertaken to date.

The Project Office, established in Tufanbeyli in June 2011, is the centre for:

- Information dissemination to the local villages and wider area;
- Land acquisition discussions and transactions;
- People seeking opportunities for employment.

It is also understood that one of the project office communication officers has been appointed from the local community, with the responsibility for direct communication with the local community.

Environment-related concerns have been raised by the project affected communities during the social surveys. Issues raised include noise (particularly from blasting at the limestone quarries), air pollution (potential dust damage to crops), health impacts (mainly related to air pollution), safety concerns for the community and site workers. Recent information indicates that an unsuccessful legal action was raised against the project in early 2011 by a group of non-governmental organisations (primarily environmental protection associations) and an individual for 'environmental' reasons.[16]

It is understood that the TPP Project Information Brochure/Community Pamphlet currently being prepared by EnerjiSA will provide a general description of the project (e.g. describe what a thermal power plant is and how it works, provide details of the positive and negative environmental impacts and mitigation measures to be implemented), outline the approach to public participation and provide contact numbers for comments/complaints. EnerjiSA has also confirmed that copies of the Executive Summaries (in the Turkish language) of the revised EIA and LRP will be kept in the Project Office in Tufanbeyli (and at the local construction site office, once established) for any interested party to refer to.

[16] The precise details are currently unconfirmed

In accordance with the ESMS/Contractor E&S Assurance and Monitoring Plan, auditable written records of previous and future public consultation are to be prepared and maintained a systematic manner. Records should be kept of: the kinds of information provided, the forms this took (oral, brochure, report, poster, radio, etc.) and the means of dissemination; the location and dates of meetings; description of the individuals, groups and organisations consulted; an overview of the issues discussed; description of how the issues raised were responded to, including an explanation if issues were not addressed; explanation of how these responses were communicated to those consulted and the wider public.

Similarly comments and suggestions received[17] (both positive and adverse) are to be recorded in a systematic manner in future, both to comply with the requirements of EP5 and IFC PS1 and to alert EPFIs to potential risks to their investment.

In the LRP, EnerjiSA has committed to:

- Undertaking baseline health checks and monitoring health within the local community;
- Undertaking soil analysis and air quality monitoring in the local area.

The results of the monitoring activities are to be disclosed.

The ESMS/Contractor E&S Assurance and Monitoring Plan (reviewed earlier) describes the weekly and monthly reporting required from the Contractor in relation to community/worker grievances (if any), complaints and/or requests related to Contractor activities, and interviews with local stakeholders.

EP6: Grievance Mechanism

EnerjiSA advises that all project-related 'demands and complaints' are registered in an electronic system which informs all responsible parties (Centre Social Engineer, Centre Environmental Engineer and Project Manager).

LRP Chapter 6: Public Consultation and Disclosure outlines the proposed grievance mechanism for receipt and resolution of complaints and concerns of the local community relating to implementation of the LRP and other environmental issues. According to the report, an Information Brochure describing the project is being prepared by EnerjiSA which will include contact details for project-related grievances and queries.

The mobile phone numbers of the TPP Construction Contractor's Site Manager and Project Site Manager have already been provided to the village headmen.

Past and future grievances received[18], and the responses to them, should be recorded in a systematic manner, both to comply with the requirements of EP5 and IFC PS1 and to alert EPFIs to potential risks to their investment.

The ESMS/Contractor E&S Assurance and Monitoring Plan (reviewed earlier) describes the weekly and monthly reporting required from the Contractor in relation to community/worker grievances (if any), complaints and/or requests related to Contractor activities and the actions taken to deal with complaints/consider requests.

EP7: Independent Review

This Due Diligence report has been prepared to comply with EP7.

[17] E.g. from individuals, NGOs, newspaper articles, radio/TV broadcasts, legal actions
[18] E.g. from individuals, NGOs, newspaper articles, radio/TV broadcasts, legal actions

PS1: Assessment and Management of Environmental and Social Risks

The basis of required Environmental and Social Management System (ESMS), including the Health & Safety Management Plan and Emergency Response Action Plan, has been presented in the LRP and EIA.

The TPP Contractor's HSE Plan is a comprehensive document covering HSE Policy, Organisation, Responsibilities, Reporting, Training, Site Safety Inspections, Risk Assessment, Use of PPE, Emergency Plan and Site Security. The Emergency Arrangement Procedure covers emergencies on site and emergency drills of procedures to be implemented in the event of injury, fire/explosion or search/rescue/evacuation.

As described in thehe ESMS/Contractor E&S Assurance and Monitoring Plan, the Contractor is contractually bound to develop and implement an appropriate EMP and SMP, taking into account legal obligations, the findings and recommendations of the EIA/LRP and EnerjiSA's Statement of E&S Requirements.

As outlined above, affected communities are to be made aware of the purpose, nature and scale of the project; the duration of proposed project activities; any risks to and potential impacts on such communities and relevant mitigation measures; the stakeholder engagement process and grievance mechanism.

PS2: Labour and Working Conditions

EnerjiSA (2009) Statement of E&S Requirements Section 11: Employment and Procurement requires contractors to have an employee policy covering employee rights in accordance with Turkish law and international standards (e.g. ILO conventions). All employees to have a written contract stating: job description; hours; working conditions; wage levels (normal and overtime); drugs and alcohol policy; disciplinary procedures; conditions of dismissal.

Under Turkish law, the right to form or join labour unions is regulated under the Constitution (Article 51) and the Criminal Code. Article 53 of the Constitution maintains the rights of employees and employers to enter into collective bargaining agreements in order to regulate economic and social conditions as well as working conditions.

Turkish Labour Law 4857 (adopted May 2003) states that:

- 'young employees who have not completed the age of sixteen years and children must not be employed on arduous and dangerous work';
- 'boys under the age of 18 and women irrespective of their age must not be employed on underground or underwater work like in mines…"
- 'Children and young employees under the age of 18 must not be employed on industrial work during the night'.

The Labour Law also lays out the requirements for investigating 'measures to be taken to avert or reduce the terminations aw well as measures to mitigate or minimise their adverse effects on the workers concerned' before any collective dismissals.

EnerjiSA has provided an extract regarding Health and Safety from the Mine Tender which states that 'since the works specified in the Heavy and Dangerous Works Regulation will be carried out in the worksite, the Contractor shall not absolutely employ any worker under 18 years of age within the worksite.'

Similarly, the scope of work for the EPC Contract for the power plant is categorised as 'Heavy and Dangerous Works' so the employment of any worker under 18 years of age is prohibited.

EnerjiSA's Health and Safety operations have recently been revised and strengthened[19]. A specific H&S professional has been appointed to overview H&S for the TPP Project (e.g. to act as team leader for Contractor's H&S team, review Contractor's H&S reports and monitor H&S performance on site).

EnerjiSA has confirmed that it will implement Occupational Health and Safety (OHS) systems throughout the various project phases, which will not only provide a healthy and safe working environment for its employees, but also will minimize the potential project-related risks on communities within the vicinity of the project area. OHS systems will be implemented through EnerjiSA's Contractor although the company will have full responsibility. According to the Contract, (Technical Part Volume II of III, Section 26, QA/QC and HS Management, page 386) HS (Health and Safety) management is well described and referenced to OSHA standards and Turkish Laws and regulations.

PS4: Community Health, Safety and Security

EnerjiSA has an Environmental and Social Management System (ESMS). The ESMS defines EnerjiSA's responsibilities and the Contractor's responsibilities. The Contractor is contractually bound to develop and implement an appropriate EMP and SMP, taking into account legal obligations, the findings and recommendations of the EIA/LRP and EnerjiSA's Statement of E&S Requirements. The parameters to be monitored, standards/guidelines to be achieved and actions to be taken when standards/guidelines are breached should be clearly identified.

The LRP identifies health issues (potentially resulting from deterioration in local air quality) as a concern to the local community. EnerjiSA is to undertake a baseline health survey and to monitor, and publicise the results, of regular health monitoring in project affected villages.

PS5: Land Acquisition and Involuntary Resettlement

The LRP was commissioned by EnerjiSA to comply with PS5. As indicated above, the report identifies practical measures which can be implemented to address the economic displacement caused by the loss of agricultural land, e.g. providing technical training tailored to the requirements of the construction workforce; promoting local employment and procurement; providing investment advice.

Although the precise nature of the interventions are yet to be developed (e.g. what technical courses, held when and where, for whom), the LRP M&E Framework provides a basis for monitoring its effectiveness. The framework defines monitorable (and auditable) indicators and measures; frequency of monitoring; duration of monitoring (i.e. project development phase); parties responsible for monitoring.

A budgetary framework has also been developed which indicates the funds required to be earmarked for LRP implementation.

EHS General Guidelines - Health and Safety

As indicated above, EnerjiSA has confirmed that it will implement OHS systems throughout the various project phases, which will not only provide a healthy and safe working environment for its employees, but also will minimize the potential project-related risks on communities within the vicinity of the project area.

The Contractor will be contractually obliged to prepare and implement an appropriate HSE Plan. The Contractor will also be contractually bound to develop and implement an appropriate

[19] Presentation to Due Diligence Team on 24th February 2012

ESMP, taking into account legal obligations, the findings and recommendations of the EIA/LRP and EnerjiSA's Statement of E&S Requirements.

EHS Guidelines: Mining

The mining guidelines outline a number of issues relating to OHS and Community Health and Safety. As the mining contract has not yet been awarded, there is no specific mine-related HSE Plan to review.

The EHS guidelines highlight the need to:

- conduct pre-placement medical examinations to the requirements expected of an employee, e.g. good eyesight for a driver;
- conduct occupational health assessments for employees on a regular basis, depending on exposure to risk, and to retain medical records for at least 20 years;
- manage occupational exposure to noise and vibration, e.g. by ensuring that large machinery is equipped with a sound proof cab;
- control exposure to hand-arm vibration from hand and power tools or whole-body vibration from surfaces on which the worker stands;
- provide workers and visitors with the necessary PPE (at a minimum, safety helmets and footwear, plus ear, eye and hand protection) and provide instruction and monitoring in their appropriate use and maintenance.

The HSE guidelines will need to cover mining-specific issues such as the storage and handling of explosives.

EHS Guidelines: Thermal Power Plants

The guidelines outline a number of issues relating to OHS and Community Health and Safety aspects of operating a thermal power plant. The TPP Contractor's HSE Plan provided for information/review covers the construction phase of the power plant. A further HSE Plan will be required for the operational stage covering, amongst other issues:

- Non-ionising radiation;
- Heat;
- Noise;
- Confined spaces;
- Electrical hazards;
- Fire and explosion hazards;
- Chemical hazards;
- Dust.

5.11 Summary

The TPP project development cycle had been underway for some time when the EPFIs became involved. Documentation regarding environmental and social aspects reviewed to

date and the ongoing discussions indicate that EnerjiSA is working towards compliance with the Equator Principles and IFC Performance Standards.

EnerjiSA has developed an ESMS which defines the responsibilities of EnerjiSA and its contractors. Specific detailed EMPs and SMPs are to be developed in due course to address specific environmental and social issues and these documents will be reviewed against the relevant EP/PS requirements.

6 Recommendations

This report has been prepared following environmental and social due-diligence of all available documentation relating to the proposed EnerjiSA 450MW lignite-fired power plant and associated lignite mine and limestone quarry in Tufanbeyli, Adana Province, Turkey. The due-diligence has sought to identify all major issues which may prejudice the success of the Project and communicate and critical findings during the course of the due diligence.

6.1 Key Findings

The TPP project development cycle had been underway for some time when the European Lenders became involved. Documentation regarding environmental and social aspects reviewed to date and the ongoing discussions indicate that EnerjiSA is working to compliance with the Equator Principles and IFC Performance Standards.

With the preparation of the recent revised EIA and SIA plus supporting documents, environmental and social aspects of the Project have been assessed in detail by EnerjiSA. Various management plans have been outlined for mitigating key potential environmental impacts. In particular, detailed technical assessments and outline mitigation measures have been developed to manage dust, erosion & sediment control, noise & vibration, blasting operations, solid waste management, river diversion, cultural heritage and the protection of terrestrial and aquatic flora and fauna during construction and operation of the Project. Provided that these plans are implemented and maintained throughout the Project construction and operation, environmental risks associated with these issues should be managed to avoid significant impacts and in turn to achieve compliance with IFC requirements; these plans and commitments should therefore be covenanted under the Project.

Notwithstanding the above, there are several potential risks that could remain on the Project:

- **Particulate and Dust Impacts**

  There are predicted to be exceedances of the WHO and EU guidelines for short term and long term particulate concentrations as a result of operation of the Project, predominantly arising from the mining operations, traffic and dumping operations. The predicted impacts exceed IFC requirements. In addition, the existing background concentrations of particulates in the area are already high, so the cumulative impacts of the Project and the background exceed guideline levels.

  While the revised EIA indicates that the predictions are likely to be over-estimates, nevertheless, the predicted impacts appear to exclude several potential sources (notably the stockpiles) and yet are still identified as significant. At this stage the mining contractor for the Project has not yet been selected, therefore EnerjiSA has outlined proposed monitoring and mitigation measures within a Dust Management Plan. This plan will be adopted and developed by the appointed mining contractor in order to demonstrate that the Project can meet IFC requirements during construction and operation. Even with the adoption of the plan, there remains a potential risk that the Project will give rise to elevated dust impacts. The management and monitoring of the mining contractor throughout the Project is therefore considered to be key to maintaining compliance on air quality and dust issues. It is important therefore that – due to the size and complexity of the Project - EnerjiSA creates and maintains a team of sufficient resource and authority to deliver the required level of environmental monitoring and management of site operations.

- **Stakeholder Engagement and Public Consultation**

  Stakeholder engagement is now being undertaken on the Project in accordance with the LRP and forthcoming consultation events are planned based around a brochure that is in preparation plus a presentation of potential visual impacts of the Project. It is recommended that the next round of consultation events is independently monitored to verify that the consultation process and engagement meet IFC/ EP requirements.

- **Thermal Efficiency and Carbon Emissions**

  There is a concern with regard to the justification for the use of the proposed lignite, since the ensuing design of the TPP leads to a proposed thermal efficiency of the Tufanbeyli power plant (circa 34% net) that is below the IFC guidelines, European BAT levels and the level indicated in the Corporate policies of several European Lenders (>40% net). It is recognised that the proposed efficiency is in the top 25% of comparable plants in Turkey, and therefore meets IFC requirements. The design also appears to have been optimised to provide as efficient and operable plant as could be achieved with the quality of lignite, but this still falls short of best practice standards for new build power plants. A separate Carbon Strategy Paper has been drafted to consider potential carbon issues associated with the Project and to demonstrate the need for the development. Nevertheless, this still remains a potential public perception issue for European Lenders.

- **Health and Safety**

  EnerjiSA has developed a robust Health and Safety management policy and plan and has recently expanded the corporate health and safety team. In addition, the TPP Contractor has prepared an HSE Plan for the Project which covers the key issues including site induction, contractor and sub-contractor management and worker safety. It is also understood that the EnerjiSA team regularly audit the Project construction site and contractors. It is further understood that a comparable HSE Plan will be prepared by the mining contractor once appointed.

  Nevertheless, health and safety issues remain a potential reputation risk for the Lenders, since it is understood that there have been incidents and accidents on other construction sites for which EnerjiSA is the Investor and Owner, which are operating under the same corporate policies and procedures. This is a Category A project involving the development of an open cast mine, limestone quarry, power plant and associated roads, transmission lines and infrastructure. Clearly there is the potential for any project of this nature to have an impact on health and safety and it is important that EnerjiSA continues to demonstrate a top-down approach to health and safety and to put in place and maintain a corporate and site team of sufficient resource to manage the required health and safety monitoring and control requirements. This in turn will also provide the correct culture across site management, contractors and sib-contractors alike, for successful implementation of the Project.

7 Glossary

AMD	Acid Mine Drainage
BAT	Best Available Technique, as defined in the European BREF Guidance
BREF	European Reference Document on Best Available Technique
CCS	Carbon Capture and Storage
CFBB	Circulating Fluidised Bed Boiler
CMLA	Coordinating Mandated Lead Arrangers
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ELV	Emission Limit Value
ESP	Electrostatic Precipitation
FGD	Flue Gas Desulphurisation
GHG	Greenhouse gas
IED	EU Industrial Emissions Directive 2010/75/EU
IEA	International Energy Agency
IFC	International Finance Corporation
K-Sure	Korea Trade and Insurance Corporation
LARAP	Land Acquisition and Resettlement Action Plan
LCP	Large Combustion Plant
PM	Particulate Material
RAMEN	Regulation on the Assessment and Management of Environmental Noise (Turkey, 2005)
SIA	Social Impact Assessment
SMP	Social Management Plan
SNCR	Selective Non Catalytic Reduction
TPP	Tufanbeyli Power Plant

8 Reference Documents

DOKAY-EIA Env. Eng. Ltd. Co (March 2008); Adana-Tufanbeyli Power Plant, Mines Supplying Fuel for the Power Plant and Limestone Deposits Environmental Impact Assessment Report (Translation)

DOKAY-EIA Env. Eng. Ltd. Co (March 2008); Capacity Increase Project for Tufanbeyli Thermal Power Plant, Mines Supplying Fuel for the Power Plant and Limestone Deposits Project Introduction File (Translation)

EnerjiSA (undated); Request for Proposal for a Land Acquisition and Resettlement Action Plan for Tufanbeyli TPP and Coal and Limestone Quarried Project

EnerjiSA (March 2011); Tufanbeyli TPP EPC Annex 14, Performance Guarantees – Liquidated Damages p9/19

EnerjiSA (February 2009); Environmental and Social Statement of Requirements, Rev 1

Fichtner (April 2004); 450MW CFPP Tufanbeyli Technical and Environmental Pre-Investment Study Final Report

IMC (August 2011); Tufanbeyli Coal Mine Due Diligence Report 881C

Shaw Consultants International, Inc. (September 2011) Independent Technical Review Tufanbeyli Power Project Draft Report

Tufanbeyli TPP Environmental Consultancy (undated); Scope of works EIA and EMP

SK Engineering and Construction (March 2011); Water Balance Diagram

Vattenfall Europe Mining AG (2009); Mining Project Report for Tufanbeyli Lignite Mine.

Figure 1: Map of Project and Surrounding Area

Indicative areas shown, based on data provided by EnerjiSA