

**OTOGAR – BAĞCILAR
MASS RAIL TRANSPORT SYSTEM
CONSTRUCTION, ELECTROMECHANICAL
WORKS AND VEHICLE SUPPLY
PROJECT**

**ENVIRONMENTAL
MANAGEMENT PLAN**



 <p>GÜLERMAK - DOĞUŞ ADI ORTAKLIĞI</p>	<h2 style="text-align: center;">ENVIRONMENTAL MANAGEMENT PLAN</h2>	Date : 01.10.2005 Rev : 0 Page : 2 / 13
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1. OBJECTIVE

To determine methods for planning activities of GÜLERMAK - DOĞUŞ J.V. on the fields of “environmental management” and “occupational health and safety” (OHS).

In that context,

- Definition of the extents of the environment and classify those extents in order of importance in order to determine the significant current and potential future impact of GÜLERMAK - DOĞUŞ J.V. products, services and activities on the environment.
- Determination of the hazards that products, services and activities of GÜLERMAK - DOĞUŞ J.V. may pose, risk assessment and determination of methods to manage the risks,
- For this purpose, definition of current laws, regulations and regulatory rules applicable to products, services and activities of GÜLERMAK - DOĞUŞ J.V., observation of the same, and provision access to current versions thereof.
- Ensuring the evaluation of projects for the environment and hazards and thus determine risks.

2. REFERENCES

- [ISO 14001:1996](#)
- [OHSAS 18001:1999](#)
- [GÜÇEK](#)
- [Related environmental and labour law and regulations](#)
- [Guidelines on Definition of Hazard in Works](#)

3. METHOD

3.1 Environment

3.1.1. Definitions

Environment: It is the air, water, soil, natural resources, flora, fauna, people in the place where GÜLERMAK - DOĞUŞ J.V. continues its activities and surroundings where these figures interact.

Environmental aspect/factor: It is the elements of the activities, products or services of GÜLERMAK - DOĞUŞ J.V. in interaction with the environment.

Environmental impact: All kind of changes whether positive or negative that arise in the environment caused by the activities, products or services of GÜLERMAK - DOĞUŞ J.V.

Environmental objective: General intent determined by GÜLERMAK - DOĞUŞ J.V. on the basis of its environmental policy for its own use and which is expressed in quantitative numbers wherever possible.

Environmental target: It is the measurable results of the environmental management system of GÜLERMAK - DOĞUŞ J.V. The criteria related to these results are determined based on the principles of policy, objectives and targets and in a way that facilitates the management of environmental aspect.

Environmental Management Program: The means the way and time used and the personnel assigned for an objective and target.

3.1.2. Determination of environmental (factors of) aspects

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GÜLERMAK - Determination of environmental (factors of) aspects in GÜLERMAK - DOĞUŞ J.V. are realised in different levels and stages. To be able to determine the environmental aspect all products, services and activities of GÜLERMAK - DOĞUŞ J.V. are investigated.

The works realised at the site (mobilisation, site management -field, laboratory, production, storage, etc.-, camp management –food, accommodation, etc.-, demobilisation, etc.) are evaluated in place. The person who ensures the coordination is the “HSE Officer,” who ensures decision-making process by “inter-function HSE team” under the leadership of Project Manager.

The Occupational Health and Safety Board appointed determines the environmental aspects.

The identification of environmental aspects outlined above is realised at the stage of the formation of a HSE (Health, Safety and Environment) system, and the current status is observed and then this process is repeated at periodic intervals.

An “Occupational Health and Safety Board” is set up with representatives of all the departments under the coordination of HSE Officer. These teams identify the environmental aspects of the operations that can be controlled or manipulated and then document them with the related forms.

“Occupational Health and Safety Board” documents all necessary activities, processes, and services in light of the “work or project or site, camp or facilities” information. For this purpose the documents such as “process flow charts, lay outs of facilities, etc.” are used. If there are suppliers/subcontractors working at the site of GÜLERMAK - DOĞUŞ J.V. on temporary or permanent basis, their activities are also considered in determining the environmental aspect. To be able to identify the environmental aspect, general environmental aspect categories are utilised. Although these categories are not limited to those below, they shall be useful for the team.

The Objectives and Targets document has been developed by Gülermak Doğuş JV as a reference document outlining the environmental objectives and targets committed to under the Construction Environmental Management Plan.

Objective	Target
<input type="checkbox"/> Minimise impacts of the Project to the natural and built environment	<input type="checkbox"/> No events where Project Environmental Criteria are exceeded
<input type="checkbox"/> Minimise environmental impacts to business, the community and the public	<input type="checkbox"/> Obtain a satisfactory resolution with the complainant
<input type="checkbox"/> To implement Best Economically Available Technology (BEAT) at the source and to typical work practices, to minimise noise pollution and vibration.	<input type="checkbox"/> Achieve BEAT when benchmarked national construction practice.
<input type="checkbox"/> To carry out construction activities in a manner that minimises noise pollution and vibration.	<input type="checkbox"/> Zero environmental fines or prosecutions.
<input type="checkbox"/> To carry out construction activities in a manner that prevents or minimises the emission and potential impacts of dust	<input type="checkbox"/> Zero environmental fines or prosecutions.
<input type="checkbox"/> Minimise construction phase damage to properties caused by settlement due to groundwater drawdown.	<input type="checkbox"/> Settlement within Project criteria.
<input type="checkbox"/> Manage construction phase environmental impacts associated with groundwater drawdown.	<input type="checkbox"/> No adverse impacts to trees or the environment.
<input type="checkbox"/> Minimise the potential impacts associated with intercepting contaminated groundwater.	<input type="checkbox"/> No exceedance of Project water quality discharge limits.
<input type="checkbox"/> To carry out construction activities in a manner that minimises water pollution.	<input type="checkbox"/> Zero environmental fines or prosecutions.

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<input type="checkbox"/> Ensure that all spoil is categorised according to the relevant waste guidelines in İstanbul, and is appropriately handled, transported and disposed of.	<input type="checkbox"/> All spoil material is transported to a place that can lawfully accept that waste.
<input type="checkbox"/> To raise the awareness and understanding of waste management principles and practices in accordance with the waste management hierarchy of: <ul style="list-style-type: none"> • Avoid; • Reuse; • Recycle/reprocess and; • Disposal 	<input type="checkbox"/> All induction and training of all staff to link the waste management hierarchy to everyday work activities.

Categories of the general environmental aspects (factors)

Emissions to the air – Exhaust	Waste water discharges
Liquid and solid wastes – Machinery / equipment scrap – Filters – Oily cotton waste, glove, oil absorbing materials – Chemicals, pipe etc. and lids for them – Used sling, pallet and wood pieces – Household waste – Glass bottles for soft drink – Plastic containers – Car battery, battery, etc. – Paper, packaging waste, carton – Toner, ink cartridges	Energy utilisation – Natural gas / LPG / Nitrogen / etc. – Electricity – Oil / fuel / gas oil
Rain water discharges	Water usage
Storage tanks	Material usage – Hydraulics oil usage – Motor / transmission oil usage
Noise	Odour
Natural environment – Dust – Smoke	Status of the land

Some of the environmental aspects (factors) have a larger impact on the environment due to their particular properties, and these types of environmental aspects are called “distinct environmental aspect”. In order to determine environmental aspects, the arguments are listed in 4 sections. The details of the subject matter are given under the section “Determination of Distinct Environmental Aspects” below.

All identified environmental aspects (distinct or not) are listed and kept in forms. The “Occupational Health and Safety Board” reviews the lists before the review meetings in every six months (in January and July). The addition of new aspects to the list and removal of the ones that are no longer valid are thus realised.

3.1.3. Determination of distinct environmental aspects

“Occupational Health and Safety Board” reviews and evaluates the identified environmental aspects and determine those aspects which are the distinct in accordance with the following

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criteria. Whenever a new aspect is to be added to the related forms. It is reviewed by “Occupational Health and Safety Board” to determine whether it is distinct or not.

When the environmental aspect of GÜLERMAK - DOĞUŞ J.V. are evaluated by “Occupational Health and Safety Board, the aspect can be classified as “a distinct environmental aspect” so long as it falls into one of the categories listed below:

1. (R) If an environmental aspect is subject to legal, regulatory rules, conditions requiring a permit and/or other conditions, then it is a distinct environmental aspect.

It covers the environmental aspects related to processes and activities, if:

- 1) environmental regulations and other requirements determine the control items and other conditions,
- 2) provision of information / issuance of report is necessary and/or
- 3) periodical inspections or applications (as in the form of execution of a judgement) are made.

The strategic plans of the company and other environmental effects mentioned in other applicable documents are also considered under this title.

2. (A) If there are regulatory rules regulating the cases of potential “accidental release” (liquid and gas only) and the amount of release is enough to raise a concern with respect to the environment, then this shall be a distinct environmental aspect.
3. (E) Environmental aspects relating to the use of energy are distinct environmental aspects.
4. (L) If the environmental aspect bears a high environmental load with respect to one or several of the following criteria, then it is a distinct environmental aspect:
 - Toxicity (composition of materials and wastes)
 - Instructions of employers on restricted / prohibited materials
 - Quantities (released volume and mass)
 - Quantities (consumption of renewable and non-renewable resources)
 - Frequency of events
 - Significance of actual or potential impacts

3.1.4. Determination and maintenance of Environmental / Occupational Health and Safety objectives and targets

“Inter-functional HSE team” determines and ensures maintenance of environmental/occupational health and safety objectives and targets for which all distinct environmental aspects and risks have been assessed. The objectives and targets are in consistence with the “[HSE Policy](#)” of GÜLERMAK - DOĞUŞ J.V.

Environmental objectives are arranged to ensure that they correspond with the following: for “control”, “improvement” or “investigation”

The following items are taken into consideration when the environmental objectives and targets are determined:

- Environment related laws and other requirements
- Technological options
- Financial, operational and business related conditions
- Opinions of related parties: employees and community are also included.

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Occupational Health and Safety objectives are determined in the following way:

- Reduction of risk levels
- New properties for Occupational Health and Safety
- Improvement of actual properties
- Prevention of the undesired accidents or reduction of their frequency

“HSE Officer” shall provides the “Project Manager” with the results obtained from the environmental / Occupational Health and Safety applications monthly. The results are recorded in the Monthly Report and made accessible by those people working in electronic medium.

“Occupational Health and Safety Board” reviews the performance results of the environmental / Occupational Health and Safety objectives and targets in every six months. The results are approved in the “Environmental objectives and targets” of GÜLERMAK - DOĞUŞ J.V.” review meetings.

3.1.5. Determination and Maintenance of Environmental / Occupational Health and Safety (OHS) management programs

“Occupational Health and Safety Board” determines and maintains environmental / OHS objectives and targets to ensure the achievement of environmental / OHS objectives and targets developed for distinct environmental aspects and OHS hazards considered risky. However, they update the programs in every six months (in January and July). A draft program is issued first and presented to the review meeting. The program approved in the review meeting (in February and August) comes into force.

Environmental / OHS management programs identify the way/method to be adopted, opportunities to be used, timing and responsibilities to achieve the related objectives and targets. Responsibilities shall be determined for each division and level of the organisation.

If practicable environmental / OHS objectives and targets are developed, then HSE management programs may be issued for the following items:

- Securing the compliancy with regulations / rules
- Prevention of pollution / reduction of wastes
- Power management
- Material management
- Work survey – determination of timing schedule, equipment and responsibility sharing, etc. needed for fulfilling the works safely,
- Training programs

3.1.6. Laws, Regulations and other requirements governing Environment / Occupational Health and Safety

There are “national and regional laws, regulations and other requirements” and “employer’s instructions” to be observed for the products, services and activities of GÜLERMAK - DOĞUŞ J.V.

“HSE Officer” shall provide and update the laws, regulations and other requirements.

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Employer's instructions containing more technical content (like those on restricted / prohibited materials) are monitored by the "Technical Office" and their up-to-dateness is arranged accordingly.

The original copies of the said documents and their old copies on which "cancelled" seal is affixed since they are no more valid are kept by "HSE Officer" and those related to technical subjects kept by "Technical Office".

"HSE Officer" invites all related parties to inform them any change/new situation in the laws, regulations and similar conditions. The representatives of all departments of the company and if necessary, the representatives of the employer, project related authorities or suppliers are included in this information meetings.

3.1.7. Review of the projects with respect to the environment / OHS

In case of a new or changed situation occurs, assessments are made with respect to environment / OHS and necessary measures are taken. For this purpose, "Project Environmental Control Plan" and "Risk Assessment Criteria" are used. This allows to determine the budget requirements for the environmental / OHS infrastructure of the project and also to pre-determine new environmental aspects occurring and whether they are distinct or not and any potential OHS risks. After that, the actions stated in the paragraph of "**Identification of Environmental aspects (factors)**" and "**Identification of OHS Hazards**" and the implementation of HSE system is started in the project.

ENVIRONMENTAL ISSUES

NOISE AND VIBRATION MANAGEMENT

The potential noise and vibration impacts associated with the construction of the Otogar Bağcılar Light Rail Project can be summarised as follows:

- Regenerated noise and vibration from tunneling works,
- Noise from surface works, including demolition of existing structures, road works, cut and cover and construction of new surface structures in the vicinity of portals and connection points;
- Noise generation from spoil removal including vehicle ingress, loading of trucks and egress of vehicles; and
- Noise from support activities and fixed plant at construction sites.

Noise impacts will be one of the key community concerns of this Project and will therefore require close and careful management. Vibration impacts will be less significant, but will also have the potential to cause community concern relating to both human comfort issues and potential property damage.

Control measures that may be implemented throughout the site include noise walls, sound suppression equipment on plant, restricting operating hours, community consultation and regular information bulletins, monitoring of noise levels and response to complaints that may be received.

SPOIL MANAGEMENT

The construction of the proposed tunnels and stations and the excavation of the foundations for the superstructure will generate bulk material, comprising predominantly silty sand and conglomerates. Recycle and reuse initiatives will be incorporated within the construction methods. Excess material will be transported off site to areas where spoil may be reused.

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GROUNDWATER MANAGEMENT

Groundwater characteristics will be investigated in terms of potential impacts of settlement of nearby structures, groundwater inflow as well as control, handling, treatment and disposal of contaminated groundwater.

Ground settlement during construction may result from a change in stress in the ground strata due to tunnelling or the altering of the ground water table due to seepage in the excavated tunnel. Settlement will be addressed via design and construction methods. Groundwater influx may be reduced through grouting or by using physical barriers. Water that does infiltrate the tunnel will be treated prior to discharge from the site.

WASTE MANAGEMENT AND REUSE

During the construction of the Otogar Bağcılar Light Rail Transit Project waste will be generated from a wide range of construction processes and may include:

- building wastes
- demolition wastes
- excavated material
- general waste from construction compounds; and
- office waste

The JV will implement waste minimisation and management initiatives throughout the construction phase based on the hierarchy of reduce, re-use and recycle. Where ever practicable, waste will be reduced at its source via the design and construction methods employed, procurement policy and sound construction management practices. Wastes that are generated will be classified, segregated where possible and a detailed disposal strategy for each type of material prepared. Re-use and recycle opportunities will be identified and implemented where ever practicable

DUST MANAGEMENT

During the construction of the Otogar Bağcılar Light Rail Transit Project, temporary impacts on air quality may arise from the generation of dust by:

- Earthworks activities such as excavation, backfilling etc.
- Demolition of existing structures;
- Site operations such as material stockpiling and vehicle transport; and
- Driven tunnel works where the air is extracted from the tunnel face and filtered before being expelled to the surrounding environment.

Mitigation and control measures will be relative to the impact and the proximity to local sensitive receptors. Such measures may include:

- Watering of haul roads, unsealed access roads, material stockpiles, exposed earth surfaces etc;
- Water, when appropriate, during dozing, final grading, excavation, and piling;
- Operation of wheel wash for trucks leaving the construction zone;
- Covering of loaded truck leaving site;
- Revegetating as soon as practicable after completion of earthworks; and
- Provision of tunnel ventilation and scrubbing system to ensure that the air quality within the tunnel and in the surrounding environment meets health and safety standards.

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CONSTRUCTION WATER

Runoff from construction of the Otogar Bağcılar Light Rail Transit Project has the potential to impact on the surrounding water ways by:

- increasing suspended solids, oil and grease, and chemical pollutants from runoff and/or potential spills etc.;
- causing localised scouring and erosion; and
- increasing flow demand on the existing stormwater system and therefore altering local flood regime.

Mitigation and control measures will be implemented to minimise the possible impact on the surrounding environment such as:

- Undertaking a detailed catchment analysis to determine the impact of construction site runoff & water treatment plant volumes on the local stormwater drainage system.
- Minimising the amount of disturbed land on site by progressive regeneration therefore reducing the amount of sediment laden runoff;
- Preventing the export of sediment from disturbed land by providing sediment fences, road grids under outgoing traffic lanes, and sediment basins at the downstream end of disturbed catchments;
- Separating clean water where ever possible to reduce the volume of water requiring treatment;
- Provision of oil separators at the downstream end of vehicle maintenance and parking areas; and treat water onsite prior to discharge.
- Provision of spill kits and training on site to prevent pollutant entering the drainage system.

EMERGENCY RESPONSE

Potential environmental emergency situations include:

- handling and / or storage of hazardous substances and dangerous goods;
- storage of oils and other hazardous liquids;
- disposal of spillages;
- conducting hazardous activities with potential for spillage such as refuelling or maintenance of plant and equipment, mixing of cutting oil with bitumen;
- undertaking hazardous activities such as washing out of concrete delivery vehicles, refuelling plant and handling of hazardous chemicals; and
- damage to unexpected service lines such as gas, electricity, telecommunications, water and sewerage.

OTHER ENVIRONMENTAL IMPACTS

The Otogar Bağcılar Light Rail Transit Project exhibits a range of construction related environmental impacts will be managed. The following outlines some of these environmental issues and how Gülermak Doğuş JV will manage these impacts.

VISUAL IMPACTS

Construction of the Otogar Bağcılar Light Rail Transit Project will result in temporary visual impact due to site layout, site fencing and the operation of equipment. Measures that may be used to minimise visual impacts include:

- Using temporary fencing as a medium for public/community art programs;

- Minimise the amount of site lighting that 'spill' into the surrounding area;
- Minimise the possibility of vehicle lights shining toward sensitive receptors such as residential premises;
- Establishing vegetation barriers wherever practicable

TRAFFIC INGRESS AND EGRESS

Site compounds and work areas will also require traffic ingress and egress points. This has associated traffic related impacts such as congestion and possible loss of parking.

VEHICLE AND PLANT EMISSIONS

Construction traffic and the use of plant and equipment on site will produce emission which may cause nuisance to local sensitive receptors. It is expected that this impact will be minimal, however it will be managed via:

- Design of site layout to minimise queuing requirements and therefore associated vehicle emissions;
- Pre-work plant and vehicle inspections to detect "smoky" vehicles. If visible smoke were seen from any equipment (while working on a construction site) for longer than 10 seconds duration, the equipment would be taken out of service and adequately repaired or tuned;
- Ensuring construction equipment is properly maintained to comply with relevant exhaust emissions standards.
- Ensuring that hire agreements contain provisions to stand down equipment which has excessively smoky exhaust;
- Restricted delivery and/or spoil handling hours and vehicles per hour; and
- Underground heavy plant will be fitted with catalytic converters.

These measures are expected to minimise the impact to an acceptable level, however they will be reviewed in light of any complaints that may be received. No open burning or incineration is permitted at any construction site.

RESOURCE CONSUMPTION

The construction of the Otogar Bağcılar Light Rail Transit Project will inevitably consume resources. It is the intention of the Consortium to minimise this wherever possible, firstly in the design process and secondly during construction. During the design stage minimisation of resources has to be considered concurrently with safety and functionality of design. Construction methods will be used that minimise the consumption of resources such as fuel.

SETTLEMENT OF STRUCTURES

The groundwater management plan will outline how settlement of structures from groundwater drawdown will be addressed. Settlement due to stress relaxation will also be also considered during the design phase of the project via similar methods such as:

- Pre-construction dilapidation surveys;
- Geotechnical investigations;
- Settlement modelling (convergence & surface settlement);
- Design of tunnel structure to limit settlement near sensitive receptors; and
- Use of construction techniques which limit settlement to acceptable levels.

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During the construction phase, monitoring will be undertaken on a regular basis to compare actual settlement values against the model. If it becomes apparent that settlement may be exceeding those limits then further mitigation measures, such as changes in tunnelling technique and greater use of support structures, will be implemented to ensure compliance.

3.2. OCCUPATIONAL HEALTH AND SAFETY

3.2.1. Definition

Accident: An undesirable incident causing a death, disease, injury, damage or other loss.

Hazard: A potential resource or situation that may cause the injury or sickening of people, damage to goods and working place or their concurrent occurrence.

Hazard Identification: Process defining the existence and characteristics of a loss.

Incident: An event that causes or has potential to cause an accident. Incidents that occurs without causing a disease, death, injury, damage or other loss are qualified as “about to occur” – “narrow escape” incidents. Incidents also include “narrow escape ones”.

Occupational Health and Safety– OHS: Factors and conditions that influences the wellbeing of employees, temporary employees, contractor’s employees, visitors and other people in the working site.

Risk: Combination of results of a harmful incident that can occur and the probability of the occurrence of that incident.

Risk assessment: In all processes, to predicate the size of the risk and decide whether the risk can be resisted or not.

Safety: A situation that does not contain any intolerable damage risk.

Tolerable Risk: The risk reduced to a level that GÜLERMAK - DOĞUŞ J.V. can resist, considering the legal requirements and the company’s own OHS policy.

3.2.2. Identification of OHS Hazards and risk assessment

The first stage of occupational health and safety in GÜLERMAK - DOĞUŞ J.V. is the identification of the term hazard. Identification of hazard shall be made in all working fields of GÜLERMAK - DOĞUŞ J.V.

For this purpose, three factors shall be taken into consideration as determinant:

- Routine and non-routine activities,
- Activities of the personnel who are able to access the site (including the subcontractors and guests),
- Facilities/installations provided by GÜLERMAK - DOĞUŞ J.V. or other parties at the site.

These three factors shall be taken into consideration in all working fields of GÜLERMAK - DOĞUŞ J.V. for identification of hazards.

Hazard identification criteria:

- Position of machinery, equipment and tools in the working site,
- Protective of the machinery, equipment and tools operating area and other protective systems,
- Status of machinery, equipment and tools,
- Periodical/preventive maintenance and controls of machinery, equipment and tools,
- Status of operating area,
- Physical and chemical conditions of the working area,
- Status between the employees and machinery, equipment and tools,

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- Experience and training of the employees,
- Health status of employees,
- Moral and motivation of employees,
- Unconfident/unconscious behaviours of the employees,
- Frequency of OHS checks and controls.

After this stage, the works are continued in accordance with the following paragraphs:

- **Determination and maintenance of Environmental / OHS objectives and targets**
- **Determination and maintenance of Environmental / OHS management programs**
- **Laws, regulations and other requirements related to Environment / OHS**
- **Review of the Projects with respect to Environment / OHS.**

4. RESPONSIBILITIES

HSE Officer

- To report and distribute the reports of the Occupational Health and Safety Board,
- To document the identification and up-to-dateness of environmental aspects / OHS hazards, environmental / OHS objectives and targets,
- To ensure the determination and maintenance of the HSE management programs,
- To observe and direct the activities made in field with respect to HSE management system and to ensure the collection of data,
- To monitor the laws, regulations and other requirements related to HSE and ensure the up-to-dateness of the applications in field,
- To provide training on laws, regulations and other requirements related to HSE,
- To ensure the review of the project with respect to HSE and the allocation of the resources required for this purpose.

Occupational Health and Safety Board

- To ensure the in-house communication on Environment and OHS (Occupational Health and Safety),
- To identify, document and update the environmental aspects / OHS hazards and accordingly, the environmental / OHS objectives and targets
- To create HSE management programs and assist in application after the approval,
- To study on new and changing situations.

Project manager

- To review and approve the environmental / OHS (HSE) objectives and targets,
- To review and approve the HSE management programs,

Department managers

- To ensure the participation in Occupational Health and Safety Board,
- To manage the activities to ensure the achievement of HSE objectives and targets,
- To manage the activities for maintenance of HSE management programs.

5. RECORDS

- Environmental planning forms

Environmental aspects, objectives and targets
Environmental management programs
Project Based Environmental Control Plan

- OHS planning forms

OHS hazards, objectives and targets
OHS management programs
OHS Risk Assessment Criteria

Site records shall be kept by the HSE Officer until the completion of the project. With the demobilisation of the site, the records are continued to be kept or destroyed as determined by the Project Manager.