



**CLIENT:** LONDON UNDERGROUND LIMITED

**CONTRACT REF:** TLL 7917

**NORTHERN LINE EXTENSION**

**MAIN WORKS CONTRACT**

## **AIR QUALITY MANAGEMENT PLAN**



### **Issue and Revision Control**

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## 1.0 Introduction

The purpose of this Air Quality Management Plan is to set out the measures that will be undertaken throughout the Northern Line Extension (NLE) works to mitigate the adverse impacts of construction activities on air quality and to meet NLE and legal requirements.

To ensure that this document remains relevant, adequate and effective as the works progress the Air Quality Management Plan will be reviewed and updated as necessary:

- following any change in scope of work that has an impact on environmental requirements;
- as instructed by the Project Manager; and
- at least every 6 months.

This plan complies with the requirements of the Code of Construction Practice (CoCP) Part A.

## 2.0 Scope

The scope of this Air Quality Management Plan includes four work sites and areas affected by the NLE works. This plan is designed to cover the construction of the NLE which will create a new underground line as an extension to the existing Charing Cross branch of the Northern line between Kennington and a terminus station to the south of Battersea Power Station. The extension will consist of new twin bore running tunnels of 5.2m internal diameter and covering a distance of approximately 3.3km with two permanent ventilation shafts at Kennington Park and Kennington Green and new stations at Battersea and Nine Elms.

## 3.0 Description of the sites

The surface worksites associated with the construction of the NLE are located at Battersea, Nine Elms, Kennington Park and Kennington Green.

**Battersea Station worksite** is located within the south western section of Battersea Power Station (BPS) development, within the London Borough of Wandsworth. Where the worksite abuts Battersea Park Road, Battersea Park Road is at a higher level than the site. The site is bounded to the west by Network Rail, to the north by Battersea Power Station and to the east by Battersea Power Station Development Company;

**Nine Elms Station worksite** including part of the Covent Garden Market Authority (CGMA), is located on the land to the west of A3036 Wandsworth Road and north of its junction with Pascal Street, within the London Borough of Lambeth. The worksite includes the north footway of Pascal Street. The worksite is bounded to the north by a Sainsbury's worksite and to the west by land owned by Covent Garden Market within the London Borough of Wandsworth. The demolition of the Banham building on the west end of the worksite, the

CGMA office, boiler house, including the chimney and underground fuel tanks and the relocation of two substations are necessary to release the full area of the worksite.

**Kennington Green worksite** is located at Kennington Green within the London Borough of Lambeth. The triangular site is bounded on all three sides by Kennington Road, the eastern boundary being the main route of the road. The worksite includes footways and parking bays. It is necessary to carry out some demolition to release the full worksite. There is a local satellite worksite (hereafter referred to as Montford Place) to the west of Kennington Green adjacent to the Beefeater Gin Distillery and this is accessed via a narrow road to the west of Kennington Green. The area although not containing any permanent works for NLE is very close to the Kennington Green shaft. FLO has taken early occupation of the area and developed it for 'satellite' temporary offices and storage.

**Kennington Park worksite** is located in the north east corner of Kennington Park, south of Kennington Park Place west of its junction with St Agnes Place, within the London Borough of Lambeth (LBL). It is necessary to demolish Kennington Park Lodge to release the full worksite.

Two shafts of approx. 25m deep will be sunk at Kennington Green and Kennington Park respectively. These shafts will be used to remove the Tunnel Boring Machine's (TBM), service the Sprayed Concrete Lining (SCL) running tunnels up to the step plate junction, build the step plate junction and build the four cross passages at Kennington Station. The current proposal to build the step plate junction includes two SCL gallery tunnels but this method is currently being reviewed.

## **4.0 Requirements**

### **4.1 UK Legislation**

The Ferrovial Agroman Laing O'Rourke joint venture (FLO) environmental management system maintains an up to date register of environmental legislation that is referenced in the aspects and impacts register. Below is a summary of legislation relevant to air quality that is current at the time of writing this plan:

- Transport and Works Act Order (TWAO)
- Environmental Protection Act 1990 Part III
- Control of Pollution Act 1974
- Common Law Nuisance
- Clean Air Act 1993
- Ozone Depleting Substances Regulations EC2037/2000
- Control of Asbestos Regulations 2006
- Environment Act 1995
- Air Quality Standards Regulations 2010
- Pollution Prevention and Control Act 1999
- Pollution Prevention and Control (England and Wales) Regulations 2011

## **5.0 Aspects and Impacts**

There are numerous activities on construction projects that if unmitigated can give rise to elevated levels of dust including, demolition, poor stockpile management, site traffic movement on unmade road and muckaway activities. The additional vehicular movements associated with construction can also increase particulate emissions such as Carbon Dioxide and Nitrogen Oxide, reducing the air quality in these areas.

The potential receptors include local residents, site workers, office workers, street going public and any sensitive receptors identified at the start of works.

## **6.0 Community Liaison**

The FLO Team provide a 24 hour helpline which is publicised during the works, and included on any information sheets letter dropped to nearby residents in advance of works taking place. Letter drops are utilised to keep the local communities updated on works.

All air quality complaints received will be recorded, investigated and corrective actions implemented and feedback given to the complainant. Where the complaint is received directly, it will be logged with the NLE Helpdesk.

## **7.0 Generic Mitigation Measures**

The following generic dust mitigation measures are implemented when construction methods are being considered:

- Choice of methodology/ technique for dusty operations is considered in order to eliminate or reduce dust;
- Wherever possible fabrication/ dismantling is undertaken off site;
- Dust producing plant is kept as far away as possible from sensitive areas (and may be screened);
- Plant is well maintained (with efficient dust suppression systems) and switched off when not in use;
- The movement of delivery materials is handled in a manner which minimises dust production and disturbance;
- All employees are provided with an appropriate induction and ongoing briefings regarding management of environmental issues (i.e. dust mitigation measures required from the works they are carrying out);

The following generic mitigation measures to reduce emissions are implemented in relation to construction plant:

- Not leaving engines of vehicles and equipment running unnecessarily;
- Maintaining vehicles and equipment in accordance with the manufacturers specifications;
- Locating haul routes and where practicable operating equipment away from potentially sensitive receptors;
- Using mains or battery powered equipment where available;

- Ensuring all non-road mobile machinery, where practicable uses low sulphur fuel;
- An equipment log will be developed and will detail all the proposed list of equipment, its EU stage standard, exhaust emission compliance, MOT validity and duration on site;
- In compliance with the London Low Emissions Zone, vehicles used by FLO on the NLE will meet the emission standards outlined in tables 1, 2 and 3 below; Consideration will also be given for zero or ultra-low carbon vehicles such as electric, hybrid or bio-methane vehicles. The benefits of using these vehicles will be evaluated against cost, duration on site and total emission savings.
- It is recognised that Euro VI vehicles offer a substantial improvement in emissions, FLO will look to use the Euro VI standard HGVs whenever practicable however due their recent introduction there is limited availability within the national fleet.

**Table 1: European Emission Standards for Road Vehicles**

|                            | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 |
|----------------------------|---------|---------|---------|---------|---------|---------|
| Cars                       | Euro 5  | Euro 6  | Euro 6  | Euro 6  | Euro 6  | Euro 6  |
| Vans ≤ 1205kg kerb weight  | Euro 5  | Euro 6  | Euro 6  | Euro 6  | Euro 6  | Euro 6  |
| Vans 1205 -1660kg          | Euro V  | Euro VI | Euro VI | Euro VI | Euro VI | Euro VI |
| Vans > 1660kg              | Euro V  | Euro VI | Euro VI | Euro VI | Euro VI | Euro VI |
| Heavy duty Vehicle >3500kg | Euro VI | Euro VI | Euro VI | Euro VI | Euro VI | Euro VI |

**Table 2: European emission standards for Non Road Diesel Engines**

|                   | 2014/15  | 2015/16  | 2016/17  | 2017/18  | 2018/19  | 2019/20  |
|-------------------|----------|----------|----------|----------|----------|----------|
| 19 – 37kW engine  | Stage 3A | Stage 3A | Stage 3A | Stage 3A | Stage 3A | Stage 3A |
| 37 – 56kW engine  | Stage 3B | Stage 3B | Stage 3B | Stage 3B | Stage 3B | Stage 3B |
| 56 – 560kW engine | Stage 3B | Stage 4  | Stage 4  | Stage 4  | Stage 4  | Stage 4  |

**Table 3: Certified CO2 limits (g/km)**

|                           | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 |
|---------------------------|---------|---------|---------|---------|---------|---------|
| Cars                      | 95      | 90      | 85      | 80      | 75      | 70      |
| Vans ≤ 1205kg kerb weight | 105     | 100     | 95      | 90      | 85      | 80      |
| Vans 1205 -1660kg         | 145     | 140     | 135     | 130     | 125     | 120     |
| Vans > 1660kg             | 205     | 200     | 195     | 190     | 185     | 180     |

## **Compliance with London Low Emissions Zone**

From 1<sup>st</sup> September 2015, in Greater London non-road mobile plant within specified power outputs will be required to meet Stage IIIA of the Directive as a minimum, and Stage IIIB within the Central Activity Zone or Canary Wharf. The NLE construction works will be located within London's Central Activity Zone.

These requirements form part of the procurement process for plant selection. There is an acknowledgement that it may currently be cost-prohibitive for some plant to meet the standards and the GLA will publish a list of plant that will, for a time, be exempt from the policy for example specialist equipment. Justification for using this equipment will be agreed with the LU Project Manager.

### **8.0 Specific Mitigation Measures**

#### **8.1 Dust Control**

Three levels of control for dust impacts are planned, with the standard level, Tier 1, as the minimum that will be implemented on all sites. A risk-based approach will be used to identify construction sites with potential to generate significant quantities of dust near sensitive receptors and which require additional levels of control (Tiers 2 and 3).

#### **8.2 Dust monitoring**

FLO are ensuring that, unless agreed with the relevant local authority as appropriate, dust monitoring is carried out during construction at all medium (Tier 2) and high-risk (Tier 3) sites. A risk-based approach is used to identify the type of dust monitoring to be used at each worksite by looking at the details of the specific packages of work within the site boundaries, the dust raising potential of those construction activities, proximity to potential receptors and the duration of construction activities at each location. This approach is detailed in section 12.0

The *Greater London Authority Supplementary Planning Guidance "The Control of Dust and Emissions During Construction and Demolition" 2014* recommends that a minimum of two continuous particulate automatic monitors for PM<sub>10</sub> are used on medium (Tier 2) and high (Tier 3) risk sites. In addition the guidance recommends that on certain sites it may be appropriate to determine the baseline situation before construction begins. FLO will also consider the IAQM "Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites".

The local planning authority will provide advice on the appropriate air quality monitoring procedure and timescale - the requirements of which will be determined on a case by case basis.

Where sites have a risk score that assigns them to the low risk (Tier 1) category, no dust monitoring will be carried out. Where sites have a risk score that is in the medium risk (tier 2) category, passive deposition monitoring techniques (glass slides/frisbee gauges/sticky pads) will be adopted at appropriate locations (site boundaries/local receptors) according to



specific site conditions as outlined further below. Where sites have a risk score that is in the high risk (tier 3) category, additional monitoring techniques will be adopted according to specific site conditions as outlined subsequently.

### **8.3 Tier 1, 2 and 3 dust control procedures**

The following dust control measures are employed as appropriate:

1. No burning of any materials or wastes on site;
2. Provide an adequate water supply to the working areas;
3. Dispose of run-off water from dust suppression activities, in accordance with appropriate legal requirements;
4. Maintain all dust control equipment in good condition and record maintenance and servicing activities;
5. Keep site fencing, barriers and scaffolding clean using wet methods;
6. Provide easily cleaned hard standing for vehicles;
7. Ensure regular cleaning of hard standing using wet sweeping methods;
8. Not allow dry sweepings of large areas;
9. Provide and maintain the wheel wash facilities near the site exit wherever there is a potential for carrying dust or mud out of the working area, onto the road;
10. Fit wheel wash facilities with rumble grids to dislodge accumulated dust and mud prior to leaving the site wherever practical and there is a potential for carrying dust or mud out of the working area;
11. Where practicable ensure there is an adequate area of hard surface road between wheel wash facilities and the working area exit;
12. Where practicable install hard surfaced long term haul routes, which are regularly damped down with fixed or mobile sprinkler systems;
13. Inspect haul routes for integrity and instigate necessary repairs to the surface, where required, immediately;
14. Regularly damp down un-surfaced haul routes and working areas in dry conditions;
15. Routinely clean public roads and access routes using wet sweeping methods;
16. Position the exhausts of vehicles working on site to minimise the risk of re-suspension of ground dust (exhausts should point upwards);
17. Impose and signpost maximum speed limits of 5 mph on un-surfaced haul routes and working areas. FLO may submit proposals for increasing these speed limits, including additional control measures, to the NLE Project Manager for acceptance and the agreement of the local authority.
18. Fully sheet all vehicles carrying loose or potentially dusty material to or from the working areas;

19. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
20. Mix large quantities of cement, bentonite, grouts and others similar materials in designated areas which shall be enclosed or shielded;
21. Store materials with the potential to produce dust away from working area boundaries;
22. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out;
23. Minimise the amount of excavated material stockpiled in the working areas and sheet, seal or damp down unavoidable stockpiles of excavated material held in the working areas;
24. Where reasonably practicable avoid double handling of material;
25. Where reasonably practicable use water suppression during high dust activities;
26. Hold a copy on the site of any permits required for any crushing or grinding equipment used on the site which falls within the definition in Section 3.5. of the Pollution Prevention and Control (England and Wales) Regulations 2000 SI1973;
27. Where required, use enclosed rubble chutes and conveyors on crushing or grinding equipment, or use water to suppress dust emissions;
28. Use enclosed conveyors where crossing roads, other public areas and property;
29. Sheet or otherwise enclose loaded bins and skips;
30. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment;
31. Seal or re-vegetate completed earthworks immediately after completion;
32. Use design/ prefabrication to reduce the need for grinding, sawing and cutting on site;
33. Use cutting, grinding or sawing equipment fitted, or in conjunction with, suitable dust suppression techniques such as water sprays or local extraction.

#### **8.4 Tier 2 and 3 dust control procedures**

The following dust control measures are employed as appropriate:

1. Strip insides of buildings before demolition;
2. Bag and remove biological debris (such as birds' nests and droppings) or damp down such material prior to demolition;
3. Retain walls and windows, wherever reasonably practicable, while the rest of the building is demolished to provide a screen against dust;
4. Screen buildings where dust producing activities are taking place with debris screens or sheeting;

5. Avoid carrying out earthworks during dry weather if reasonably practicable having regard to programme or provide, and ensure appropriate use of, water sprays to control dust;
6. Ensure slopes on stockpiles are no steeper than the natural angle of repose of the material and maintain a smooth profile;
7. Ensure equipment is readily available on the site to clean any spillages, and clean up spillages immediately;
8. Ensure mixing of cement, bentonite, grout and other similar materials takes place in enclosed areas remote from site boundaries and potential receptors;
9. Use increased hoarding height, where appropriate, to protect receptors;
10. Fully enclose sites or specific operations where there is a high potential for dust production and the site is active for an extensive period.

FLO may propose alternative control measures provided that the resulting control is at least as effective as that arrived at using the measures specified above.

### **8.5 Tier 3 dust control procedures**

These procedures are relevant where there is a high risk of significant adverse impact from dust emissions due to the proximity of receptors, the type of activity on site or the duration of operations. In such cases the highest standard of dust control reasonably achievable will be adopted, which will incorporate all relevant Tier 1 and Tier 2 techniques as set out above, as well as additional relevant measures as outlined below. Measures to be used will be site specific and will be proportionate to the level of risk arising, such as having personnel on site to monitor and manage dust emissions.

For such Tier 3 sites and in addition to the monitoring outlined above, existing baseline dust levels are established prior to the commencement of any potentially significant dust-creating activities. Where practicable, such baselines will make reference to data sourced from local background PM<sub>10</sub> concentrations (such as measured by the Automatic Urban and Rural Network (AURN) monitoring sites and appropriate local authority automatic monitoring sites and those established by dust monitoring in the neighbourhood) and will ideally refer to data from the preceding 12 month period.

As part of this baseline work, FLO will as far as is reasonably practicable ensure that:

- a. Monitoring data is available for a suitable duration prior to construction.
- b. Data is collected as PM<sub>10</sub> µg/m<sup>3</sup>
- c. Any unusual activity in the vicinity of monitoring sites that may affect monitoring results and/or create a false baseline (e.g. local construction activity) are avoided or noted by local monitoring site operators.
- d. Dust monitoring commences as soon as reasonably practicable to provide localised data to augment the data obtained from the AURN/local authority sites.

During specified construction events, particulate monitoring will be undertaken using appropriate survey instruments such as Osiris, Topaz, DustScan or similar devices sited at

appropriate locations such as site boundaries, potential receptors or in a transect orientated to the prevailing wind, as required by specific site characteristics.

The survey instruments used will operate an alarm (PC based or mobile phone) should a predetermined site action level be reached. This level will be established in consultation with the relevant local authority and by reference to both local authority and AURN PM<sub>10</sub> monitoring data. Subject to such consultation, a preliminary site action level of 250µg/m<sup>3</sup> (15 minute average) is proposed for PM<sub>10</sub>.

If the alarm is triggered the following actions will be taken:

- a. The nominated person or someone delegated by the nominated person will as quickly as reasonably practicable investigate activities on the site to ascertain if any visible dust is emanating from the site or activities are occurring that are not in line with dust control procedures.
- b. Any identified causes will be rectified where practicable. Actions are recorded in the site logbook and the relevant local authority notified of the incident and actions by telephone or e-mail as soon as practicable after or during the incident.
- c. If no source of the incident is identified the local authority and/or AURN monitoring sites is contacted to establish if there is a wider area increase in particulate concentrations.
- d. If the cause of the alarm is not related to site operations the outcome of any investigation is recorded in the site logbook and reported to the relevant local authority at an appropriate time.

Dust monitoring is continued until the site has a risk score that assigns it to the lower risk category.

To ensure plans are co-ordinated and dust and particulate matter emissions are minimised, regular liaison meetings with site managers and /or environmental managers of other high risk construction sites within 500m of the site boundary will occur.

## **9.0 Odour**

Controls are implemented to minimise the risk of odours that may be considered a nuisance, (predominantly through good housekeeping) such as:

- covering containers holding waste and regularly removing waste containers from site;
- removing odour source;
- emptying septic tanks on a regular basis;
- avoiding the use of odorous materials.

Additional mitigation may include:

- spraying with an approved oxidising agent; and
- applying an odour guard or masking agent.

## **10.0 Incident Response**

The following actions need to be carried out in the event of an exceedance of the agreed thresholds, obvious visual impacts, and/or complaints.

- i. Onsite activities will be immediately inspected to identify likely sources;
- ii. If onsite sources are identified as triggering the agreed thresholds the relevant activities will be halted until remedial measures can be implemented (e.g. wetting down, road sweeping, sheeting up).
- iii. The activity will then be monitored to ensure that the mitigation measures are working and that there is no repeat incident.
- iv. Should a complaint be received then the complainant is to be contacted by the Community Liaison Team for follow up.

The NLE Project Manager will be notified of the issue as soon as practical, along with details of any corrective and preventative actions.

## **11.0 Training**

All site personnel are made aware of the air quality issues covered in this plan during site induction. Regular toolbox talks are also given to remind all site personnel of the requirements on a regular basis. All training received is logged.

Method statements and risk assessments are also written and briefed to all site personnel before any works that may impact air quality is carried out on site. Integrated into these documents are specific control and risk mitigation methods relating to the air quality issues detailed in this document.

## **12.0 Classification of the Sites**

Worksites have been categorised into one of the three Tiers according to dust risk and have been assessed on the basis of site activities and sensitivity of nearby receptors.

Each Tier has been based on Site Evaluation Guidelines set out in the "*Mayor of London Best Practice Guidance: The control of dust and emissions from construction and demolition 2006*".

### **Low Risk Sites – Tier 1**

- Development of up to 1,000 square metres of land and;
- Development of one property and up to a maximum of ten; and
- Potential for emissions and dust to have an infrequent impact on sensitive receptors.

Based on the area of the construction sites, there is a potential for emissions and dust from Tier 1 worksites to have an infrequent impact on sensitive receptors.

Dust mitigation measures for Tier 1 sites have been detailed above.

### **Medium Risk Sites – Tier 2**

- Development of between 1,000 and 15,000 square metres of land and;
- Development of between ten to 150 properties and;
- Potential for emissions and dust to have an intermittent or likely impact on sensitive receptors.

Based on the area of the construction sites, there is potential for emissions and dust from Tier 2 worksites to have an intermittent or likely impact on sensitive receptors.

Dust mitigation measures and monitoring requirement for Tier 2 sites have been detailed above. The Tier 2 worksites include:

- Kennington Green;
- Kennington Park;
- Montford Place
- Nine Elms Station (during construction activities).

### **High Risk Sites – Tier 3**

- Development of over 15,000 square metres of land, or;
- Development of over 150 properties or;
- Major Development referred to the Mayor and/or the London Development Agency or;
- Major development defined by a London borough or;
- Potential for emissions and dust to have significant impact on sensitive receptors.

Based on the area of the construction sites, there is potential for emissions and dust from Tier 3 worksites to have significant impact on sensitive receptors.

Dust mitigation measures and monitoring requirements for Tier 3 sites have been detailed above. Tier 3 worksites include:

- Battersea Station
- Nine Elms (during the demolition activities)

Please note that the site classifications can be reconsidered if site activities are considered to have a particularly high or low dust risk.

## **13.0 Collection, Interpretation and Reporting of Monitoring Data**

### **13.1 Collection and Interpretation of Monitoring Data**

The automatic air quality monitors have a telemetry connection, which enables air quality to be monitored remotely rather than relying on the collection of data from the field. In addition trends and anomalies are reported as they occur.

The communications configuration on the automatic air quality monitors allow trigger levels to be pre-programmed to alert of potential exceedances of pre-set PM<sub>10</sub> trigger levels, thus allowing a rapid response to elevated levels. Trigger alerts from the monitors are delivered by text or email to FLO project staff and actions are taken accordingly.

### **13.2 Reporting**

Weekly air quality monitoring reports are produced as required at each worksite. To ensure effective and consistent reporting and feedback of monitoring results, all monitoring is undertaken using a proforma designed for that purpose. The monitoring reports summarise the measured levels (including minimum, maximum and average of the weekly 15 minute monitoring intervals) and provide a basic analysis of any changes or increases in level, relative to the baseline period.

The report also highlights any exceedance of the site action level and actions taken in response to the exceedance. Exceedances of the 24 hour PM<sub>10</sub> standard (50µgm<sup>-3</sup>) are also recorded.

Any photographic records taken during the onsite inspections are kept, recorded and maintained alongside monitoring records.

## **14.0 Records and Reporting**

Environmental records are maintained by the Environmental Manager and reporting on environmental issues is undertaken on a monthly basis. A system of real-time alerts and triggers enables data to be collated more frequently when adverse environmental conditions are experienced. Such alert and trigger data is reported within the weekly reports, along with details of environmental incidents and external complaints.

## **15.0 Complaint and Incident Procedures**

Complaints are recorded by the FLO community liaison team, with enquiries directed to the Community Relations Representative.

It is the responsibility of Community Liaison Manager to respond to and follow up all complaints regarding dust. The Project Manager is responsible for ensuring that suitably qualified personnel are available to respond to complaints. Actions to be taken by FLO:

- Note the time, date, identity and contact details of complainant. Wind direction and strength and weather conditions are to be recorded. Note if the complaint

has been referred from the local authority. Ask complainant to describe the dust emission; is it constant or intermittent, how long has it been going on for, is it worse at any time of day, does it come from an identifiable source.

- As soon as possible after receipt of a complaint undertake a site inspection. Note all dust producing activities taking place and the dust mitigation methods that are being employed. If the complaint was related to an event in the recent past, note any dust producing activities that were underway at that time, if possible. Implement any remedial action necessary.
- As soon as possible visit the area from where the complaint originated to ascertain if dust is still a problem.
- As soon as possible after the initial investigations have been completed contact the complainant to explain any problems found and remedial actions taken.
- Notify the Project Manager, Community Liaison Manager, Environmental Manager and local authority as soon as practicable that a complaint has been received and what the findings of the investigation were and any remedial measures taken.