

ENVIRONMENTAL RISK ASSESSMENT
Shell UK Oil Depot, Wokingham Road, Earley

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1.0 Introduction

RPS Thomson (RPS) has been commissioned by Wokingham District Council (WDC) to undertake an evaluation of the former Shell Oil Depot, Wokingham Road, Earley, to assess current public health risks and any likely statutory nuisance.

The purpose of this report is to review the recorded information made available to WDC in regard to this case, and to provide an independent evaluation of any potential health risk to neighbouring residents. This evaluation is based on an assessment of the potential toxicological and environmental risks associated with the site, and carried out in light of a complaint from the occupier of 337 Wokingham Road regarding potential health risks from the site.

Section 2.0 of this report provides a brief summary of the history of the Shell site, including a review of recent site investigations and remediation works. Section 3.0 provides a risk assessment of the potential for health effects and statutory nuisance associated with contamination from the site, based on the 'source-pathway-target' model.

This report is based on available factual data obtained from WDC relating to the Shell site. Additional consultations have been made with the following:

- Mr B Penny, Environment Agency, Guildford
- Pollution Incident Database, Environment Agency, Reading
- Mr P Saddler, Thames Water Utilities
- Mr M Elliot, Pesticide Safety Directorate, MAFF
- Mr T Meadows, Railtrack Southern.

A visit to the depot site was undertaken by the consultant, accompanied by a representative of WDC, on 12th January 1998 for the purposes of a walk-over inspection.

The information reviewed is not necessarily exhaustive, and further information relevant to the site may be available from other, as yet unidentified sources. Where any data supplied by the client or from other sources has been used it has been assumed that the information is correct. No responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party.

This report is written in the context of an agreed scope of work with WDC and should not be used in a different context. Furthermore, new information, improved practices and changes in legislation may necessitate a re-interpretation of the report in whole or in part after its original submission. The report is

provided for sole use by the client and is confidential to them and their professional advisors. No responsibility whatsoever for the contents of the report will be accepted to any person other than the client unless otherwise agreed in writing.

2.0 Site History

The site in question is located to the rear of Wokingham Road, Earley, at SU 755717, and occupies approximately 0.9 ha, (see Figure 1). Up until the early 1900's the site was undeveloped marsh/woodland. By 1933 an oil depot had been established, and the site underwent significant expansion and reorganisation in 1962, and again in 1968. The date at which Shell became owner of the site is not known.

The depot was used for the bulk storage and distribution of oil products including paraffin, aviation kerosene, petrol, diesel and fuel oils. It is also known that vehicle cleaning materials, anti freeze and lubricants would have been used on the site. No distillation or barrelling was undertaken. The site was supplied by rail only, with a sidings located to the north of the site, although subsequent dispatch was by road and rail.

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There is anecdotal evidence of a fire in the sidings in 1986. It has not been possible to obtain any information relating to this incident - the Fire Brigade only retain records for five years, and the Pollution Incident Database maintained by the Environment Agency had no record of the event. Shell have not supplied any details.

The site was decommissioned in 1989 with the demolition of remaining structures undertaken in 1991/2.

In 1992/3 Shell UK commissioned a site investigation resulting in the implementation of the first stage of a site restoration scheme. A desk study was undertaken in March 1992 by WA Fairhurst & Partners ahead of the site investigation. The site was identified as being underlain by approximately 1.5 m of sand and gravels, over London Clay. Groundwater was located at between 1.5 and 3.0 m. A site investigation and remediation programme was implemented in agreement with the regulatory authorities such that the site could be redeveloped for industrial purposes. The main contaminants were identified as being mineral oils, volatile hydrocarbons and Polyaromatic Hydrocarbons (PAHs). During the remediation works, investigation and analysis confirmed that contamination from the site had not migrated to the southern boundary of the site.

The remedial works undertaken in early 1994 consisted of removal of some material, and in situ aeration of other parts of the site. Some complaints were received from local residents regarding odour during the remediation works. The remediation works produced a self draining profile across the site, and perimeter drainage was installed along the north, south and eastern boundaries. These drains were connected to the existing interceptor in the south east corner of the site. There is anecdotal evidence that the drain on the southern boundary may have been lined with a membrane to further minimise the risk of off-site migration of contaminants.

Persimmon Homes Ltd applied for planning permission to develop the site for residential housing in March 1997. CET Geo-Environmental Consultants Ltd undertook a second site investigation on behalf of Persimmon which identified the need for further remediation works for hydrocarbon removal prior to development. The decision on the application was deferred by the Development Control Sub Committee on 6th August 1997. Permission was subsequently granted subject to a Section 106 agreement, part of which required additional site investigation and remedial works prior to the development.

When Mr Fox discovered what was hidden here

Additional chemical site investigations were undertaken by Stats Geotechnical Ltd on behalf of Persimmon in October/November 1997 to further characterise the nature and extent of hydrocarbon contamination. The works included the excavation of 24 trial pits and five boreholes across the site, and collection of soil and groundwater samples for laboratory analysis. The results indicated no ground or contamination conditions not reasonably consistent with the identified site history.

The investigation indicated significant groundwater contamination in the shallow aquifer within the made ground at the site, specifically with regard to Total Petroleum Hydrocarbons (TPH). To a lesser extent contamination by ammoniacal nitrogen, heavy metals, PAH's and Methyl-tertiary-butylether (MTBE) [an octane booster in petrol] was identified at various parts of the site. The potential for the off-site migration of aqueous phase contamination to the south-east of the site was identified. The groundwater sample from BH 5, constructed in the south-eastern corner of the site adjacent to property No 337, was found to have elevated concentrations of TPH. No Lindane was detected. The site perimeter drainage system was considered to be at a depth too shallow to prevent the offsite migration of groundwater. It was concluded that on the basis of the results, it was conceivable that groundwater could migrate off-site in a south-easterly direction, being potentially contaminated with TPH, MTBE and ammoniacal nitrogen at concentrations of approximately 1.2 mg/l, 141 µg/l and 8 mg/l respectively. The Dutch Soil Clean-Up Guidelines, which are the generally applied guidelines for assessment of contamination of groundwaters, sets an



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THE ENVIRONMENTAL COMPANY

DRWG No

Figure 1

DATE

Old Shell Depot Site, Wokingham

DRWG No

SCALE

Intervention Value of 0.6 mg/l for mineral oils. At this level, serious contamination is considered to be present, and to require remediation.

The area of the site adjacent to No 337 incorporates the previously restored areas of the site where the storage tanks and pumping platforms used to be located. Two trial pits were dug within approximately 50 m of the boundary of the site with No 337. TP No 21 indicated no contamination of concern, whilst TP No 20 indicated elevated concentrations of TPH and cadmium within approximately the top 0.5 m of the made ground only. No Lindane was found in samples from either trial pit.

At the request of WDC, three samples were taken from the water interceptor in the south-east corner of the site for analysis. Both water and sludge samples indicated the presence of elevated TPH, and the sludge also contained elevated levels of arsenic and cadmium. No Lindane was detected.

It is understood that liability for any off-site contamination will remain with Shell UK once the site has been redeveloped.

3.0 Environmental Risk Assessment

Environmental regulators use the 'source-pathway-target pollution linkage' concept when assessing the risk posed by a contaminated site, and for a liability to arise each stage of the pollution linkage must be present. In this case, the risk assessment starts with the target, local residents, one of which is claiming to be experiencing specific and on-going adverse symptoms as a direct result of contamination from the site.

Section 2.0 of this report provides information relating to the potential 'source' of contamination through a summary of current and historical land use at the Shell site. Based on the available data this risk assessment reviews the potential sources of contamination in the vicinity of No 337 Wokingham Road. The likely exposure conditions that would be required to generate the symptoms and problems reported by the resident are discussed.

The assessment then discusses potential pathways which could have resulted in the 'target' being affected as described.

3.1 The Target - 337 Wokingham Road

From the information available, it is believed that the occupier has lived at No 337 Wokingham Road since 1988. This property is located adjacent to the south-east corner of the site, with the garden immediately abutting the site, and the house is located approximately 50 m distance from the site boundary. As discussed in Section 2.0, the oil depot was decommissioned in 1989, and partial remediation works undertaken in 1992.

In the past, the occupier has worked as a builder by trade, although no details are available regarding the precise nature of the work he undertook, or the length of time he was involved in the industry.

To the knowledge of WDC, the occupier has never visited the Shell site for extended periods of time.

As detailed in Section 3.0, the complaints of the occupier regarding potential impacts of contamination from the Shell site on his health and property are as follows:

- The vegetation at the rear of his garden has shown poor growth for at least the past 8 years, and he has not been able to grow vegetables or shrubs. No significant detail has been provided.
- There have been on-going problems regarding the potential leakage of polluted water from the connecting drain on the property which links the Shell site interceptor with the main surface water sewer that runs across the gardens of 321 to 341 Wokingham Road. One complaint has been made with regard to localised flooding in the vicinity of the manhole cover located at the rear of No 337 Wokingham Road, but this was not substantiated during a visit by WDC.
- In May 1997, whilst in one of the sheds at the rear of the garden, the occupier collapsed as a result of what he considered to be harmful fumes. Subsequent analytical testing by WDC did not establish the presence of any hydrocarbon gases at levels of concern to human health.
- The occupier claims he is experiencing severe, on-going medical problems, although the details of his condition remain unclear. It is not known how long he has been experiencing problems, or the actual symptoms of his illness. In a radio interview for Thames Valley FM on 3rd October 1997, his symptoms were stated as including: liver/kidney pains, sleepless nights, bleeding feet and toenails, and bleeding eyes. He has not authorised discussions with his

GP. Correspondence from the German doctor who is currently treating him make specific reference to chronic long term exposure to Lindane, and possibly Dichlorodiphenyltrichloroethane (DDT) and Dichlorodiphenylethane (DDE). No details have been provided of the exact concentrations discovered.

A physical inspection of the depot site undertaken by the consultant included an inspection of the state of health of vegetation at the boundary of the site with No 337. It is accepted that the inspection was undertaken in winter when some of the vegetation was defoliated. However, there did not appear to be any obvious indications of stressed vegetation in this part of the site.

The main potential routes of exposure of this occupier to contamination could be:

- Skin contact
- Ingestion
- Inhalation.

From the available information it would appear that inhalation would be the most likely intake route.

3.2 The Source

There are three main potential sources of contamination that should be reviewed: petroleum hydrocarbon and associated contamination identified as being present at the former depot site from past site investigations; potential Lindane contamination; and other potential contaminants cited by the German doctor, including DDT, DDE, amalgam, nickel, arum, PCB, PVC and europium. Each of these potential sources of contamination are discussed in more detail below.

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3.2.1 Petroleum Hydrocarbon Contamination

Potential Sources

As discussed in Section 2.0, the oil depot was decommissioned in 1989, and partial remediation works undertaken in 1992. Potential on-going sources of surface contamination were removed with the demolition of the site infrastructure within 1 and 3 years of the complainant's arrival at No 337.

Previous site investigations have clearly established the presence of significant levels of petroleum hydrocarbon contamination in the soil and groundwater at the Shell depot site. Potential sources of this contamination included the storage and transfer of oil products, vehicles servicing, and the railway line. Whilst partial remediation was undertaken in 1992, it is known and accepted, as manifested by the Section 106 agreement, that further remediation works will be required to allow the site to be redeveloped for residential housing by Persimmon Homes.

As discussed in Section 2.0, the most recent site investigation has indicated the potential for offsite migration of petroleum hydrocarbon in groundwater in a south easterly direction.

A chemical site investigation was undertaken in the garden of No 337 in October 1996 by Wilkinson Associates on behalf of Shell, and overseen by a consultant appointed by the occupier. The investigation, which included collection and laboratory analysis of both soil and groundwater samples, did not reveal any evidence of offsite migration of petroleum hydrocarbon contamination into the complainants property in the groundwater. Slightly elevated concentrations of contaminants were found in soil samples taken from immediate proximity to the line of the drain joining the foul sewer in his garden, but were not present at levels considered to be of danger to human or plant health.

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Petroleum Hydrocarbon Toxicity

Petroleum hydrocarbons comprise a complex variety of volatile and non-volatile compounds. The majority of volatile components are harmful to health by inhalation, and excessive exposure can cause irritation to the eyes, and may result in headaches, dizziness and nausea. Direct contact with the skin, particularly with non volatile hydrocarbons, may cause de-fatting which, if prolonged may lead to flaking and dermatitis.

Occupational exposure limits exist for volatile components relating to the main exposure route of inhalation. Long term exposure limits (assuming an 8 hour time weighted average) are as follows (in ppm):

- | | |
|--------------------|-----|
| • Ethylbenzene | 100 |
| • Benzene | 5 |
| • Toluene | 50 |
| • Xylene | 100 |
| • n-hexane | 20 |
| • Trimethylbenzene | 25 |
| • Buta -1,3-diene | 10 |

At these levels, a strong odour would be detected.

The most recent site investigation identified the presence of TPH contamination at 1.2 ppm in a groundwater sample from BH5, adjacent to the site boundary with No 337. However, only one soil sample from the same part of the site, that from TP No 20, indicated the presence of TPH contamination within the made ground at a concentration of 0.3 ppm. As discussed previously, the Dutch Soil Clean-Up Guidelines, which are the generally applied guidelines for assessment of contamination of groundwaters, sets an Intervention Value of 0.6 ppm for mineral oils in groundwater, and a limit of 5 ppm in soil.

Of the less volatile contaminants at the depot site, Polyaromatic hydrocarbons (PAH's) are generally accepted as being the compound of most concern with regard to human health. Of the hundreds of individual PAH compounds, approximately 50 have been identified at hazardous waste sites in the USA, but only benzo(a)pyrene has been well characterised toxicologically. It is typically used as an index of the total PAH content of environmental samples.

The United States Environmental Protection Agency [USEPA] (1996) consider PAH's to be carcinogenic. Evidence from humans come primarily from occupational exposure which is commonly manifested in the form of skin tumours. The primary toxicological concern relates to carcinogenicity and several assumptions have to be made on setting tolerable daily intake (TDI) levels. These involve assessing cancer risk and assessing a toxic equivalence factor for PAH's. The TDI for PAH's is generally accepted as 1.4 µg/day for a 60 kg human, by ingestion. No occupational exposure limits are produced for PAH's because of their carcinogenicity.

No elevated levels of PAH's have been detected in soil or groundwater samples taken from the area of the site adjacent to No 337.

3.2.2 Lindane Contamination

Medical reports produced by the complainant indicate the main alleged contaminant adversely affecting his health to be Lindane and similar organochlorine compounds. Hexachlorocyclohexane (C₆H₆Cl₆) can exist in a number of forms of which only γHCH, known as Lindane, has insecticidal properties. Lindane has traditionally been used in a wide variety of applications including: agriculture/horticultural insecticide; seed treatment; household fumigation; topical medicinal and veterinary products; and timber preservation. Lindane has now been withdrawn from use.

Potential Sources of Lindane

Recent chemical investigations at the Shell site have indicated there to be no Lindane present on the site. Investigative work undertaken to date by several different parties have been unable to establish or confirm that Lindane was ever stored or used at the Shell site. Correspondence between Shell UK and WDC (7th November 1997) specifically states that Shell UK would not have stored Lindane as part of their operational activities at the site.

No formal records or site licenses were available indicating that anything other than oil based products were stored or used at the site.

Other potential sources of Lindane which could, theoretically, have affected the occupier at No 337 include:

- Discharge of Lindane into the surface water sewer from an upstream source, and subsequent leakage into the property. Discussions with Thames Water have revealed the catchment of the sewer to extend approximately 500 m upstream, and to serve a residential area with no industrial premises other than the Shell depot. It seems unlikely that uncontrolled discharge of Lindane into the sewer could have occurred, or continue to occur in an on-going manner. Discussions between the Environment Agency and WDC have revealed that the former have had no reason to be concerned regarding the quality of water discharged from this sewer into the River Lodden. Samples were taken from the public sewer adjacent to the garden of No 337 for analysis in February 1995, and showed no evidence of petroleum hydrocarbon contamination. However, no specific analyses were undertaken for pesticides.
- Historical spraying of the railway embankments with a combined herbicide/pesticide. In the past British Rail have undertaken extensive spraying of railway lines for weed control. Discussions with Railtrack Southern have revealed that in the past pesticides used along the section of railway adjoining the Shell site have included Atrazine and Simazine based compounds. It was also stated that there was a possibility that Lindane may also have been used, although it was not possible to confirm this. Use of these compounds would have been discontinued by the early 1990's.
- Occupational exposure as a direct result of the complainant's past trade as a builder. For many years, Lindane based products were widely used in the building trade for the preservation of timber, and fumigation of buildings.
- Personal exposure during the handling or use of a variety of products including domestic gardening applications, veterinary products, or medicinal products such as lice shampoos.

Lindane Toxicity

The toxicity of Lindane has been considered by a number of authoritative sources including Smith (1991), the World Health Organisation [WHO] (1991,1992), the USEPA (1994), the Agency for Toxic Substances and Disease Registry [ATSDR] (1992), and the Advisory Committee on Pesticides [ACP] (1992).

Lindane is rapidly absorbed following oral and dermal exposure. Greater than 90 % oral absorption has been reported, and dermal absorption in rabbits has been reported as 30 - 70 %, with lower values in humans. Lindane is excreted rapidly in mammals, with a half life of 26 hours reported after injection into humans.

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The WHO and ATSDR have concluded that Lindane is not genotoxic, and there is no evidence of cancer following long term exposure. There is no source of evidence linking sub-acute exposure to Lindane to any clear pattern in the development of symptoms. All studies accept the fact that analysis is difficult, if not impossible, as a result of concurrent exposure to other substances often used in association with Lindane.

Occupational exposure has resulted in reports of hypochromic and aplastic anaemia, increases in blood levels of several hepatic enzymes, headaches, vertigo and dizziness. Acute exposure has led to seizures and death. As with many toxicological studies the concentrations and exposures constituting 'acute' and 'sub acute' are not defined.

All toxicity studies relate to experiments in rats. These determined that acute exposure in rats resulted in neurological effects and histopathic changes such as liver enlargement at high doses of 800 $\mu\text{g}/\text{kg}$ of body weight. While the possible link between exposure to Lindane and aplastic anaemia was the primary reason for the safety review carried out by ACP (1992) it was concluded that no causal relationship existed between this condition and exposure to the chemical.

Extrapolation from animal studies has generated data for a safe or tolerable daily dose of Lindane:

- IMPR (1990) concluded an average daily intake of 8 $\mu\text{g}/\text{kg}$ body weight/day was tolerable
- WHO (1993) proposed a TDI of 5 $\mu\text{g}/\text{kg}$ body weight/day
- The USEPA propose a reference dose equivalent to a TDI of 0.3 $\mu\text{g}/\text{kg}$ body weight/day.

Various confidence levels can be placed on these figures, and analysis suggests that for a 60 kg man the TDI is 18 $\mu\text{g}/\text{day}$, and for a two year old child weighing 12 kg a TDI of 4 $\mu\text{g}/\text{day}$.

3.2.3 Other Contaminants

The German doctor, acting on behalf of the complainant, has reportedly identified a number of other potential contaminants in samples taken from his client, including, amalgam, nickel, arum, DDT, DDE, PCB, PVC, and europium. Of these, arum and europium have no known associated health effects.

The Shell depot site has never had any authorisations for the storage of Hazardous Materials.

Immediately adjacent to the north-west of the site is an electroplating works. Potential contaminants associated with such facilities include heavy metals, cyanides and acid liquors. The most recent site investigation undertaken for Persimmon revealed the presence of heavy metal contamination on the north-west part of the site immediately adjacent to the plating works, but did not reveal evidence of migration of this contamination to the south or east of the site.

Previous site investigations across the site have included chemical analysis of soil and ground water samples for heavy metals, including nickel and mercury (a significant component of amalgam). These analyses did not indicate any results of concern. With the exception of one isolated sample with elevated cadmium, all results were significantly below those prescribed as safe for development for residential housing.

No chemical analyses have been undertaken on samples from the site for the other potential contaminants identified by the doctor, but there is no evidence to suggest a source of these compounds having been used or stored at the Shell site.

3.3 The Pathway

None of the identified potential sources of contamination are associated with a clear pathway of exposure to the complainant.

On decommissioning of the depot site, and removal of surface infrastructure, the only method by which contaminants could be mobilised would be through disturbance of the soil, or offsite migration of contaminants. Disturbance could result in the release of residual volatile petroleum hydrocarbons, which, if occurring at significant levels, would be associated with a detectable odour. Odour complaints were recorded from residents during the remediation works in 1992, but none have been received by WDC since. Recent site work undertaken for Persimmon revealed persistent hydrocarbon odours being generated during the excavation of trial pits. Infrequent, short lived release of volatile hydrocarbons would not explain the recurrent nature of Mr Fox's reported symptoms.

Migration of contaminants is dependent on their physical and chemical characteristics, and upon the hydrogeological and geological characteristics of the site. The site is underlain by approximately 1-2 m depth of permeable sand and gravels, overlying low permeability London Clay. During the remediation works undertaken in 1994, cut off drains were installed along the southern boundary of the site, which may have been lined with a membrane. Recent investigations undertaken on behalf of Persimmon have revealed the depth of these drains to be inappropriate to prevent the off-site migration of contaminants in groundwater.

Site investigations and chemical analyses of soil and water samples taken from the garden of No 337 did not indicate the presence of offsite migration of petroleum hydrocarbon contamination from the site. The potential phytotoxic effects described by the occupier may not therefore be accounted for by the presence of contamination from the site, and would not be caused by Lindane, if present, which is an insecticide.

It is possible that, if applied to the railway line, Lindane could have migrated in groundwater down gradient along the natural topography to the south-eastern corner of the site. However, site investigations did not indicate the presence of Lindane in soil immediately adjacent to No 337, or from samples taken from the interceptor. Even if Lindane were present on the site, either as a result of unidentified site use or, indirectly, from application to the railway line, it is unlikely to have migrated offsite as it is easily complexed and bound with organic material, making it relatively immobile.

There is no evidence that the surface water sewer is leaking in the vicinity of No 337, and no apparent source of Lindane input into the system.

To be exposed to sufficient concentrations of organochlorine compounds to manifest physical symptoms would require long term absorption of high doses through the most efficient route, ie either oral ingestion, inhalation of aerosol, or through skin contact. Given the elimination rate of Lindane from the human body, any recorded symptoms would be a result of current, on-going, rather than historic exposure. There is no evidence to suggest the presence of Lindane in the vicinity of No 337 in sufficient concentrations to cause such symptoms.

There is no evidence to support or explain the presence of potentially harmful gases within the enclosed environment of the sheds at the rear of the garden. Dependent on the activities undertaken in the shed, the source of the alleged harmful gases may be from compounds stored and used in the shed.

There are no apparent preferential routes for migration of contamination from the rear of the garden to the house at No 337.

4.0 Conclusions

Whilst the complainant reports that he is experiencing serious medical problems, there is no quantitative evidence defining the nature of his medical problems, nor evidence to link his condition to contamination at the Shell depot site. There are no apparent sources of potentially harmful contaminants associated with an exposure pathway linking them neighbouring occupiers. In the absence of quantitative medical data it is not possible to accurately assess the nature of exposure and potential contaminant accumulation experienced.

Chemical analysis of samples taken from the garden of No 337 have indicated no significant offsite migration of petroleum hydrocarbon contamination. There is no apparent source or route whereby the occupier could be exposed to the level of petroleum hydrocarbon contamination required to generate physical medical symptoms. *R.P.S NEVER TOOK ANY SAMPLES OF 337.*

There is no evidence to suggest that the complainant has been exposed to Lindane arising from the adjacent site, and there is no quantitative data to suggest that the pattern of symptoms relates to Lindane poisoning. The complainant's symptoms are not diagnostic of Lindane toxicity because there is no recognised pattern that can solely be attributed to this compound. The complainant would need to be exposed to significantly elevated concentrations over an extended, and on going, period of time, to produce the reported physical symptoms. There is no evidence to suggest that the neighbouring occupiers have, or could be, exposed to levels of Lindane that would cause absorption of the chemical in excess of 18 µg/day.

There are no apparent sources of additional potential contaminants cited by the German doctor, although no quantitative analytical data is available from chemical site investigations to support this.

It is concluded that, on the basis of the available information, there is no evidence to indicate that the former Shell depot site constitutes a statutory nuisance by being in a state considered prejudicial to the health of the adjacent residents.

5.0 Data Sources

THE DOCS YOU CAN ASK FOR VIC

The following is a list of all documentation reviewed during the preparation of this environmental risk assessment:

- Wokingham District Council files
 - 337 Wokingham Road, Early - from 1993 to present
 - Old Shell site, Wokingham Road - from 1976 to current day (3 files)
- Desk Study Report, Shell UK Oil Terminal Reading, March 1992, WA Fairhurst and Partners
- Restoration Report, Shell UK Oil Depot, Reading, Report No R/I/D/28218/01, April 1994, WA Fairhurst and Partners
- Report on a Site Investigation at the Old Shell Depot, Earley Rise, Woodley, September 1996, CET Group

- Interpretation of the Wilkinson Associates Investigation of the Soil and Groundwater in the Garden of No 337 Wokingham Road, October 1996, Thornton Research Centre
- Report on Soil and Groundwater Analyses, 337 Wokingham Road, Reading, October 1996, Wilkinson Associates
- Geoenvironmental Report for Proposed Redevelopment at the Former Shell UK Depot, Earley nr Reading, November 1997, Stats Geotechnical Ltd.

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