STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
SITE INVESTIGATION AND RESTORATION BRANCH

PROPOSED PLAN OF REMEDIAL ACTION

September 2006

Justison Redevelopment-Phase II
221 and 300 South Madison Street
Wilmington, Delaware **DNREC Project No. 1377**

This Proposed Plan of Remedial Action (Proposed Plan) presents the Department of Natural Resources and Environmental Control's (DNREC's) proposed cleanup alternatives for the comprehensive remediation and management of approximately 10.9 acres of Brownfield property located in the Christina Riverfront. This property is planned to be redeveloped as a mixed-use residential, commercial, and retail project. For DNREC tracking purposes it is named Justison Redevelopment Phase II. For related environmental reports and more information, please see the public participation section of this document.

The purpose of the Proposed Plan is to provide; 1) specific information about the soil and groundwater conditions, 2) the cleanup alternatives DNREC has considered and 3) the proposed remedial actions for the Site. In addition, as described in Section 12 of the Delaware Regulations Governing Hazardous Substance Cleanup (Regulations), DNREC will provide notice to the public and an opportunity for the public to comment on the proposed plan. At the comment period's conclusion, DNREC will review and consider all of the comments received and then will issue a Final Plan of Remedial Action (Final Plan). The Final Plan shall designate the selected remedy for the site. All investigations of the Site, the Proposed Plan, comments received from the public, DNREC's responses to the comments and the Final Plan will constitute the Remedial Decision Record.

This Proposed Plan summarizes the Remedial Investigation and Feasibility Studies and the administrative record file upon which this Proposed Plan is based. Copies of the Site-related documents can be obtained or viewed at locations listed at the end of this document.

DNREC's proposed remedy is preliminary and a final decision will not be made until all of the comments are considered. The final remedy selected could differ from the proposed remedy based on DNREC's responses to comments.

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LIST OF ATTACHMENTS

1.0 INTRODUCTION

The planned Justison Redevelopment Phase II Project (Site) is located north of Beech Street, primarily south of West Street, between the I-95 viaduct and South Madison Street (Figure 1). Portions of this formerly industrialized area are planned for commercial and residential redevelopment. The Justison Redevelopment Phase II project will be created through the City of Wilmington's subdivision process. The process will result in three new tax parcels, parcels 6, 7, 8 and portion of future parcel 9, shown on Figure 2. In addition, the development will encompass new and realigned roads and utilities that will serve Justison Redevelopment Phase II and other destinations in the Christina Riverfront. Including the roads, Justison Redevelopment Phase II is approximately 10.9 acres in size.

Table 1 summarizes the existing property addresses, tax parcel numbers and acreages. Their current and former property names and DNREC site identification numbers are also provided, as a link to the environmental reports that have been completed for each of these parcels. Because of their industrial past uses, these properties were environmentally investigated through the Voluntary Cleanup Program (VCP) in accordance with DNREC's Hazardous Substance Cleanup Act (HSCA) Program.

Table 1 – Existing Tax Parcels that comprise Justison Redevelopment Phase II

Tax Parcel Number(s)	Property Address (& Owner)	Acreage	Former Property Names & Abbreviations	DNREC Site Number	Redevelopment Parcel
260400016, 260400018, and portions of 2604200003.	300 S. Madison St. (DelDOT) and portions of 221 S. Madison St (City of Wilmington)	3.3	Wilmington Coal Gas Site – North (WCGS-N) Wilmington Public Works Yard, Triangle Parcel	DE-1377 (former DE-1046 and DE-1090)	6
2604200003	221 S. Madison St (DelDOT)	1.9	Wilmington Coal Gas Site – North (WCGS-N)	DE-1377 (former DE-1046)	7
2604200003	221 S. Madison St (DelDOT)	2.18	Wilmington Coal Gas Site – North (WCGS-N)	DE-1377 (former DE-1046)	8 and part of future parcel 9

As to be discussed in the following sections of this Plan, the Site has been investigated and partially remediated. This Plan presents the new proposal for remediation based on the current redevelopment plans for the property.

2.0 JUSTISON REDEVELOPMENT PHASE II INVESTIGATIONS

2.1 Site Description & History

The Site consists primarily of the Wilmington Coal Gas Site – North (WCGS-N) and the portion of the Public Works Yard known as the triangle parcel. Investigation and remediation of the triangle

parcel was included in the Justison Landing Redevelopment Phase I Final Plan of Remedial Action and is not repeated in this proposed plan. The WCGS-N is located at the intersection of South Madison Street and Beech Street (Figure 3). It is bordered to the west by the Norfolk Southern Railway and an elevated portion of I-95, the Wilmington Coal Gas Site – Southern Parcel to the south, and industrial businesses and the former Wilmington Public Works Yard to the east and north. In 2004, for the purposes of the submittal of a previous final plan of remedial action for the WCGS-N, two operable units OU-1 and OU-2 were created under the HSCA Program in order to address on-site and off-site contamination, respectively. The proposed remedy presented in this plan is intended to be used for remediation of the two operable units. Off-site contaminated areas will be addressed as practicable based on accessibility of the contamination, as the redevelopment process continues.

The Site is located in an area that has been in continuous industrial use since the late 1800s. The primary use of the site was for a Manufactured Gas Plant that was built in 1889 and operated primarily between 1905 and 1961. Delmarva Power & Light Company owned and operated portions of the WCGS-N from the early 1900s until 2006 when it sold the property to the Delaware Department of Transportation (DelDOT.) Prior to 1889, the property was an undeveloped marshy area. The plant sat idle for 15 years until gas production began in 1905. An additional carbureted water gas set was added to the plant in 1907. Gas production continued through 1961 with gas production only for peaking purposes after 1935. In 1949 storage of liquefied petroleum gas began in four aboveground storage tanks which were later moved to the WCGS-South property. Beginning in 1956 until 2006, the plant site was used for a variety of other activities including liquefied petroleum gas storage, material storage, and natural gas operations and maintenance activities. During this period the above ground equipment and structures associated with gas manufacturing were removed or demolished and portions of the site paved.

2.2 Environmental Investigation History – WCGS-N

Extensive environmental investigations have been performed at the WCGS-N since 1986. Some of the significant investigations include: a 1997 Remedial Investigation, a 2002 Supplemental Remedial Investigation, a 2002 Non-Aqueous Phase Liquid (NAPL) Delineation, a 2003 Supplemental Groundwater Investigation, a 2003 Pathway Exposure Analysis, and a 2004 Focused Feasibility Study. These investigations supported the issuance of the 2004 Final Plan of Remedial Action (Final Plan) for the WCGS-N OU-1property.

The Final Plan for the WCGS-N, completed in September 2004, selected several remedial actions, as described in Section 5.0. In 2006, following the purchase of the property by DelDOT and the decision to redevelop the property, the selected remedial actions were re-evaluated and revised to select an option that would allow future redevelopment of the site as a mixed use, commercial and residential area.

Recent investigation efforts to support the new proposed remedy include the performance of an In-Situ Stabilization (ISS) Treatability Study to evaluate ISS as a viable remedial option for the site as well as limited sampling events to further delineate site contamination. The results of the historical and recent investigations *-prior the performance of any remedial action or interim remedial action-* are summarized in section 2.3. The results of the ISS are discussed in section 5.0.

2.3 Remedial Investigation Results – WCGS-N

Surface Soil

Table 2 presents a summary of analytes detected in surface soil at concentrations above DNREC's Uniform Risk-Based Remediation Standards (URS) for unrestricted use (residential) in a Non-Critical Water Resource Area (NCWRA). Since the future use of the site is for mixed residential and commercial uses, the unrestricted URS values are used for comparison.

Arsenic, benzene, several polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyl (PCBs) were detected above the URS and are considered contaminants of concern for the site. Aluminum, iron, and manganese were also detected above the URS unrestricted use values; however, aluminum, iron, and manganese concentrations were within the range of concentrations typically found in Delaware soil and these analytes are not considered to be contaminants of concern.

Table 2. Surface Soil Data Summary (0-2 feet bgs)

Contaminant	Reasonable Maximum Exposure Concentration* (mg/kg)	URS for Unrestricted Use (mg/kg)	Delaware Default Background Remediation Standard (mg/kg)***	Typical Delaware Soil Concentrations (mg/kg)
Inorganics-Metals				
Aluminum	**7,960**	7,800	7,800	4,800-12,000
Arsenic	**19**	0.4	11****	0.58-31*****
Iron	**18,400**	2,300	2,300	3,000-22,000
Manganese	**269**	160	180	60-350
Volatile Organic Compounds				
Benzene	**1.1****	0.8	N/A	N/A
Semi-volatile Organic Compounds				
Benzo(a)anthracene	**23.6**	0.9	N/A	N/A
Benzo(a)pyrene	**23.6**	0.09	N/A	N/A
Benzo(b)fluoranthene	**21.8**	0.9	N/A	N/A
Benzo(k)fluoranthene	**30.6**	9	N/A	N/A
Dibenz(a,h)anthracene	**7.2****	0.09	N/A	N/A
Indeno(1,2,3-cd)pyrene	**35.6**	0.9	N/A	N/A
PCBs				
Aroclor 1254	**1.3****	0.3	N/A	N/A
Aroclor 1260	**9.91**	0.3	N/A	N/A

* RME- Reasonable Maximum Exposure Concentration calculated as the 95% Upper Confidence Level (UCL) of the arithmetic mean of concentrations of contaminants detected at the site. RME values calculated using EPA Pro-UCL Software (USEPA, 2004).

** Maximum concentration detected due to limited detections

*** From URS Guidance (DNREC, 1999)

**** Default background arsenic level as presented in Arsenic Risk Management Proposal Draft Background Document June 22, 2005

***** Range of background arsenic concentrations in Delaware soil as presented in Arsenic Risk Management Proposal Draft Background Document June 22, 2005

N/A – Not applicable

Subsurface Soil

Table 3 presents a summary of the analytes detected in subsurface soil at concentrations above DNREC's URS for unrestricted use (residential) in a New Castle County Water Resource area (NCWRA.) As with surface soil, arsenic, benzene, several PAHs, and PCBs were detected above the URS. Aluminum, iron, and manganese were also detected above the URS unrestricted use values; however, aluminum and manganese concentrations were within the range of concentrations typically found in Delaware and these two analytes are not considered to be contaminants of concern for the site.

Table 3. Subsurface Soil Data Summary (2 feet bgs)

Contaminant	Reasonable Maximum Exposure Concentration* (mg/kg)	URS for Unrestricted Use (mg/kg)	Delaware Default Background Remediation Standard (mg/kg)**	Typical Delaware Soil Concentrations (mg/kg)
Inorganics-Metals				
Aluminum	**9,200**	7,800	7,800	4,800-12,000
Antimony	**3**	3	<0.5	<0.5
Arsenic	**27.3**	0.4	11***	0.58-31****
Iron	**32,000**	2,300	2,300	3,000-22,000
Manganese	**292**	160	180	60-350
Volatile Organic Compounds				
Benzene	**14.5**	0.8	N/A	N/A
Semi-volatile Organic Compounds				
Benzo(a)anthracene	**34.8**	0.9	N/A	N/A
Benzo(a)pyrene	**22.0**	0.09	N/A	N/A
Benzo(b)fluoranthene	**22.5**	0.9	N/A	N/A
Benzo(k)fluoranthene	**10.9**	9	N/A	N/A
Dibenz(a,h)anthracene	**3.4**	0.09	N/A	N/A
Indeno(1,2,3-cd)pyrene	**8.5**	0.9	N/A	N/A
2-Methylnaphthalene	**364**	160	N/A	N/A
Naphthalene	**418**	160	N/A	N/A
PCBs				
Aroclor 1260	**6.02**	0.3	N/A	N/A

* RME- Reasonable Maximum Exposure Concentration calculated as he 95% Upper Confidence Level (UCL) o the arithmetic mean of concentrations of contaminants detected at the site. RME values calculated using EPA Pro-UCL Software (USEPA, 2004).

** From URS Guidance (DNREC, 1999)

*** Default background arsenic level as presented in Arsenic Risk Management Proposal Draft Background Document June 22, 2005

**** Range of background arsenic concentrations in Delaware soil as presented in Arsenic Risk Management Proposal Draft Background Document June 22, 2005

N/A – Not applicable

Vapor

Table 4 presents a summary of analytes detected in the soil-gas at concentrations above EPA screening levels. Benzene and xylene were detected above the screening levels and are considered contaminants of concern for the site. The highest concentrations were detected in Non-Aqueous Phase Liquid (NAPL) areas 1, 3 and 4 (Figure 6) and are described in the sections below. However, elevated readings were also observed throughout the southern and central portion of the Site.

Table 4. Soil Gas Data Summary

Contaminant	Maximum Concentration (ppbv)	EPA Screening Level (ppbv)*
Volatile Organic Compounds		
Benzene	**2700**	0.721
Xylene	**330**	25

ppbv=parts per billion by volume

* = Screening value from EPA Region III RBC Table, Ambient Air, 10/25/2005.

Groundwater

Table 5 presents a summary of analytes detected in the groundwater in exceedance of DNREC URS levels for protection of human health. In addition to the contaminants of concern identified in the surface and subsurface soil, there are other inorganic and organic compounds in the groundwater that exceed the URS criteria. Elevated concentrations of organic compounds were detected in several locations through the property (Figure 4). Some inorganic compounds, i.e. arsenic, were detected at locations not continuous across the site. No PCBs were detected in the groundwater samples.

Table 5. Groundwater Data Summary

Contaminant	Groundwater URS for Protection of Human Health (ug/L)	Maximum Detected Concentration (ug/L)
Inorganic-Metals and Cyanide		
Aluminum	200	**228,000**
Arsenic	50	**249**
Berylium	4	**13**
Chromium	100/11 (Cr+3/Cr+6)	**596**
Iron	300	**625,000**
Lead	15	**242**
Manganese	50	**5,560**
Mercury	2	**2**
Nickel	100	**280**
Selenium	50	**51**
Thallium	2	**19**
Vanadium	26	**583**
Cyanide	200	**19,400**
Volatile Organic Compounds		
Benzene	5	**5,700**
Toluene	1,000	**78,000**
Ethylbenzene	700	**70,000**
Xylene	10,000	**45,000**
Semi-Volatile Organic Compounds		
Acenaphthene	37	**490**
Benzo(a)anthracene	0.09	**56**
Benzo(a)pyrene	0.2	**33**
Benzo(b)fluoranthene	0.09	**34**
Benzo(k)fluoranthene	0.9	**19**
Chrysene	9	**60**
Dibenz(a,h)anthracene	0.01	**6**
Dibenzofuran	2	**47**
Fluorene	24	**220**
Indeno(1,2,3-cd)pyrene	0.09	**18**
2-Methylnaphthalene	12	**1,500**
Naphthalene	20	**5,000**
Phenanthrene	120	**500**
Pyrene	18	**170**

Non-Aqueous Phase Liquid (NAPL) Areas

Oil, gasoline and/or coal tar were observed during various investigations and are collectively referred to as NAPL, meaning that they do not dissolve in water but exist mostly as a separate oily phase mixed with the soil. In the WCGS-N, six (6) NAPL Areas (Figure 6) were identified in the Supplemental RI, according to the results of the boring samples collected (see Figure 3). Typically, NAPL was detected at depths ranging from 3 to 9 feet below ground surface (bgs). The six NAPL areas are as follows:

NAPL- Area 1 is located in the southwest corner of WCGS-N. This area contains an oil-like material that is approximately 1.5 to 5.6 feet thick and located 3 to 7 feet bgs. In addition, NAPL was detected in a groundwater monitoring well in this area. Remediation by excavation in this area occurred at location TPW-17.

NAPL- Area 2 is located in the west central portion of WCGS-N. This NAPL is a tar-like material.

Approximately 0.5 feet of NAPL-impacted soil was identified in soil boring B-38, at a depth of 8 to 8.5 feet bgs. NAPL has not been detected in the groundwater monitoring wells in this area.

NAPL- Area 3 is located along the southeastern portion of WCGS-N. This NAPL is an oil-like material. Approximately 1.0 to 4.0 feet of NAPL-impacted soil was identified in this area, at depths ranging from 3 to 9 feet bgs. In addition, NAPL (sheen) has been detected in a groundwater monitoring well in this area. Based on historical use of coal tar equipment in this portion of the site (i.e., relief holders, drip wells, etc.) and the depth of NAPL-impacted soil, it appears that this NAPL could potentially be coal tar related. Test borings completed off-site, east of existing South Madison Street, identify a much lighter degree of impact as evident from soil staining rather than soil saturation.

NAPL- Area 4 is located within the material storage yard. This NAPL is an oil-like material. Approximately 0.5 to 3.1 feet of NAPL-impacted soil was identified at depths ranging 3 to 9 feet bgs. NAPL has not been detected in groundwater monitoring wells in this area.

NAPL- Area 5 is located in the southern portion of WCGS-N. This NAPL is a tar-like material. Approximately 1.2 to 5.6 feet of NAPL-impacted soil was identified at depths ranging from 3 to 9 feet bgs. NAPL has not been detected in groundwater monitoring wells in this area.

NAPL- Area 6 is located northwest of the material storage yard. This NAPL is a tar-like material. Approximately 0.5 feet of NAPL-impacted soil was identified in soil boring B-41 at a depth of 0.0 to 2.5 feet bgs. NAPL has not been detected in groundwater monitoring wells in this area.

Recent soil borings were completed in April 2006 to provide additional delineation of NAPL areas. Figure 6 includes the results of this additional NAPL delineation.

3.0 RISK EVALUATION – JUSTISON REDEVELOPMENT PHASE II

Multiple risk assessment scenarios were performed to evaluate the cumulative risks associated with exposure to the contaminants of concern identified in soil and groundwater at the Site and the potential effects to human health and the environment. These evaluations were performed prior to the excavation and removal of several areas identified as sources of NAPL contamination during the partial implementation of the Final Plan for the WCGS-N or as interim actions.

3.1 Human Health Risk Summary

A 2003 pathway exposure analysis determined that on site workers, trespassers, and off site residents have the potential to be exposed to surface and subsurface soils through particulate matter transport. Utility workers are considered to have a complete pathway for exposure to soil and groundwater due to intrusive activities. A Groundwater Management Zone (GMZ) that applies to the City of Wilmington and restricts groundwater use limits exposure to the groundwater. The exposure analysis did not consider future on site residents.

A risk evaluation using the 1999 DNREC Site-Specific Standard Calculator for Multiple Analytes indicates an unacceptable risk if people are exposed to soil or groundwater contaminants when compared with the DNREC's acceptable carcinogenic risk level of 1 x 10-5 and hazard index (HI) of 1.0 for non-carcinogenic analytes. Using the concentrations presented in Table 3, 4, and 6, which are the concentrations without any remediation, for surface soil the cumulative carcinogenic risk was 9.47 x 10-4 and the non-carcinogenic risk was 0.91. For subsurface soil, the cumulative carcinogenic

risk was 1.03 x 10-2 and the non-carcinogenic risk was 6.52. The compounds in surface and subsurface soil that most contributed to the carcinogenic risk were arsenic, PAHs and PCBs. The compounds in subsurface soil that most contribute to the non-carcinogenic risk were iron and PAHs. For groundwater, the cumulative carcinogenic risk was 4.5 x 10-2 and the non-carcinogenic risk was 287.09. The compounds in groundwater that most contributed to the carcinogenic risk were arsenic, benzene, and PAHs and to the non-carcinogenic risk were iron, cyanide, ethylbenzene, and toluene. The risk calculated for groundwater considered the use of the groundwater for drinking purposes.

Since the original intended use of the site was as a commercial property, soil vapor risk to indoor residents was not considered. An EPA approved vapor intrusion to indoor air model was used to determine the potential risk to potential occupants through the inhalation pathway. Using the maximum soil gas concentrations (Table 4) and sandy loam as the soil type as inputs to the model, the cumulative carcinogenic risk was 1.07×10^{-2}, which is greater than the HSCA target level of 1×10^{-5}. This is the risk to potential residential occupants in the NAPL areas 1,3, and 4 without any remediation of the site or engineering controls to prevent vapor migration

Currently, the soil at the site is covered with pavement and some vegetation areas and the groundwater from the site is not being used, as per the restrictions in the GMZ referenced above. However, during the redevelopment process construction workers will be exposed to the soil and groundwater. Future residents and workers also need to be protected from exposure to soil and groundwater contaminants.

3.2 Environmental Risk Summary

The Christina River is the most sensitive environmental receptor in the Justison Redevelopment Phase II vicinity. Modeling performed for the WCGS-N indicates that site groundwater does not result in any exceedances of the current DNREC URS for surface water protection or the Surface Water Quality Standards criteria for protection of aquatic life (fresh water chronic) and, therefore, does not pose a risk to surface water receptors. Although groundwater impact is present due to remaining source materials at the site, groundwater contamination at the site has shown to be confined to the source area. Modeling for potential contaminant distribution to the Christina River from groundwater contamination did not show an impact to the river. The DNREC is undertaking an area wide groundwater monitoring and evaluation project to determine if any further investigation or remediation of the groundwater in the Christina Riverfront area will be required. The results of the groundwater project will be available to the public when the project is complete.

4.0 REMEDIAL ACTION OBJECTIVES

According to Section 8.4(1) of the HSCA Regulations, site-specific Remedial Action Objectives (RAOs) must be established for all plans of remedial action. The Regulations provide that DNREC will set objectives for land use, resource use, and cleanup levels that are protective of human health and the environment. Future use of the Justison Redevelopment Phase II properties is for an urban, mixed use, residential and commercial development. To meet this planned use, the following qualitative and quantitative objectives are appropriate:

Qualitative Objectives

1. Minimize migration of contaminants of concern off-site.

2. Prevent human exposure (e.g., dermal, inhalation, or ingestion) to site-related contaminants in source materials, site soil and groundwater.
3. Protect ecological receptors by minimizing the potential for direct contact with on-site soils and future migration of site-related materials off-site.

Quantitative Objectives

1. Prevent human contact with contaminated site soil and groundwater that would result in a risk exceeding $1x10^{-5}$ cumulative cancer risks or a hazard index of 1.0 for restricted or unrestricted use, depending on the future use of each parcel.
    - Most of the Justison Redevelopment Phase II parcels will be remediated to residential levels, even though these properties will also contain retail stores and parking garages.
    - Portions of Justison Redevelopment Phase II to be used for office buildings, parking garages, and roads will be remediated to commercial levels.

These objectives are consistent with the planned use of the site as a mixed use residential/ commercial use in an urban setting, City of Wilmington zoning policies, and State and City of Wilmington regulations governing water supply and worker health and safety.

5.0 EVALUATION OF POTENTIAL REMEDIAL ALTERNATIVES

To achieve the above remedial action objectives, a range of potential remedial alternatives were presented in the Focused Feasibility Study for WCGS-N and each remedial alternative was evaluated against the criteria specified in Delaware's HSCA regulations. The criteria include protection of public health, welfare and the environment, compliance with the regulations, acceptance to the community, technical practicability, and short-term and long-term effectiveness. Previously, in September of 2004, a Final Plan of Remedial Action was approved for the site and it included the following components:

- Excavation and disposal of soils and NAPL around well TPW-17 (a well with historically the greatest thickness of NAPL at the site) to an area of less than one foot of product to reduce the source area.
- Installation of a subsurface containment wall with passive NAPL recovery sumps to prevent off site migration of residual NAPL.
- Use of phytoremediation upgradient of the containment wall to reduce groundwater mounding and mitigate off-site migration of contaminated groundwater.
- Installation of at least three groundwater monitoring wells to monitor the effectiveness of the containment wall and monitor off-site conditions.
- Capping of exposed soils with asphalt paving to prevent contact with contaminated surface soils.
- Placement of a deed restriction prohibiting current or future residential use of the property, limiting land disturbing activities, and limiting groundwater use.

Excavation and off site disposal of soil and NAPL in the vicinity of well TPW-17 (NAPL area 1) was performed and completed in 2005. Prior to proceeding with the other components of the remedial action plan the property was sold to DelDOT to become part of the Justison Redevelopment Phase II project. In light of the change in future use of the site to a mix of commercial and residential uses, DNREC reconsidered the remedial alternatives. The Focused

Feasibility Study was re-evaluated to identify alternatives that could remediate the site to unrestricted use criteria. In-Situ Stabilization (ISS) and selected excavation with off-site disposal at certain locations were selected as potentially implementable and effective alternatives.

ISS consists of stabilizing or binding the NAPL impacted soil through in-situ mixing with stabilizing agents. An ISS treatability study was performed on site soils contaminated with NAPL and it was determined that ISS was technically feasible. Several stabilization mixes and a variety of stabilizing agents (cement, slag, and bentonite) were found to meet the performance criteria for ISS. Due to the volume of the stabilizer and swelling during stabilization, the ISS process generates extra material. This excess material will be managed in accordance to a DNREC approved waste management plan. Additional evaluation was performed to assess the cost of stabilization, which indicated that ISS is a cost effective remedial option. Therefore, the selected remedy was revised to replace the containment wall and phytoremediation in the original Final Plan of Remedial Action with ISS and selective excavation at certain locations to stabilize the NAPL contaminated areas.

6.0 PROPOSED PLAN OF REMEDIAL ACTION

A Final Plan for the WCGS-N, completed in September 2004, selected several remedial actions as described in Section 5.0. The Final Plan was revised to accommodate the change in use to mix commercial and residential. The increased estimated cost in remedial actions from the Final Plan to this Proposed Plan is $1,800,000. The increase in costs is due to the additional protectiveness that is required for a residential setting.

Based on DNREC's evaluation of the Site information, which includes current and past environmental investigations, historical information, risk assessments for the contaminants present at the Site, the above remedial action objectives, and the remedial alternatives evaluated in the feasibility studies, DNREC developed a Proposed Plan of Remedial Action for the Justison Redevelopment Phase II Project. DNREC considers the proposed remedy as the best option based on the protectiveness overall implementation, technical practicality, reduction of mobility and volume, overall cost, and durability. This remedial action also provides the least disturbance to the surrounding community to achieve the remedial action objectives for the site.
The following combination of remedial actions is proposed:

> **1) Hot Spot Removal and Stabilization, 2) Environmental Management During Construction, 3) Barrier Cap, 4) Vapor Barriers, 5) Groundwater Monitoring, and 6) Institutional Controls.**

For the purpose of managing the contaminated soil at the Site for this proposed plan, surface and subsurface soil contamination has been grouped into soil management areas (SMs). There are total of three SMs:

SM1-NAPL, PAHs and Arsenic
SM2-PCBs
SM3-PAHs and Arsenic

Figure 7 shows the location of the SMs. With the exception of Remedial Action 1, all the remedial actions will be applied to all the SMs.

1. <u>Hot Spot Removal and Stabilization</u> –

NAPL areas (SM1) identified at WCGS-N will be remediated in two (2) different ways depending on the location of the residual NAPL.

- Selected areas of the site will be excavated for utility and road installation. Contaminated soil and residual NAPL will be excavated and properly disposed during utility trench and road bed construction. Upon completion of the soil removal process, the excavated areas will be backfilled with imported clean fill, or suitable onsite material that has been approved by DNREC and DelDOT. If fill is to be imported onto the property, the source will be identified and representative sampling will be performed so the source can be approved by DNREC-SIRB prior to transporting the fill onto the site.
- The remainder of the NAPL areas will be solidified using ISS. The limits of the areas to be remediated through ISS are required to be included in the remedial design work plan for the site.

Soil contaminated with PCBs (SM2) at a total concentration of 3.0 ppm (parts per million) or greater, the URS criteria for unrestricted future use of the site, will be excavated and properly disposed. Confirmatory samples will be collected to determine that cleanup was successful. The excavated areas will be backfilled with DNREC approved fill.

2. <u>Environmental Management During Construction</u> - During the planning, design and construction phases of Site redevelopment, develop and implement the following approach:

- Implement a Contaminated Materials Management Plan to describe and guide safe handling and disposal practices for contaminated soil, groundwater, underground storage tanks, debris and other materials that may be encountered during excavation work
- A Plan for Prevention of Cross-contamination of the groundwater before any construction activities begin would be included in the Contaminated Materials Management Plan. This is to limit or prevent transfer of contamination from the shallow to the deeper groundwater zone.
- Prepare a Health & Safety Plan and Training Program to guide construction and utility workers and to provide for protective measures to prevent exposure to residual contaminated materials.
- Manage excavation work during construction in accordance with the Contaminated Materials Management Plan.
- As site preparation and construction proceeds, and buildings and roads are demolished, collect appropriate samples to evaluate these areas, as needed. If contaminants are detected that require remediation, perform the remedial work in accordance with this Justison Redevelopment Phase II Proposed Plan of Remedial Action and the site specific Contaminated Materials Management Plan. If contaminants are detected at levels that require a completely different remedial alternative than is set forth in this Proposed Plan of Remedial Action, or if new areas of land are added to this redevelopment project, then DNREC will prepare and advertise a supplemental Proposed Plan of Remedial Action to address the new or extended remedy.

3. <u>Barrier Cap</u>- Place a barrier cap across the surface of the property.

- The cap will consist of a minimum of two feet of clean imported fill. The result will be a barrier that prevents access to the existing site soil.
- Collect and analyze representative samples of any imported fill and submit to DNREC for approval prior to transporting the fill onto the site.

- In areas where impermeable surfaces (including building slabs, paving and hardscaping) will be installed as part of the redevelopment process, DNREC may, in its sole discretion, deem these surfaces equivalent to 2 feet of imported earthen fill for the purpose of providing a barrier between site soil and future residents and/or office and retail-based workers.

4. Vapor Barriers - Design and install vapor barriers beneath occupied buildings. The vapor intrusion evaluations indicated unacceptable risk over three areas of the property. In addition, construction may change the subsurface and allow vapors to migrate to other areas of the Site. For this reason, DNREC has determined that vapor barriers will be installed beneath all occupied Justison Redevelopment Phase II buildings. A vapor barrier will consist of a physical barrier beneath the footprint of the occupied structure and a piping manifold which will provide a conduit for future vapor testing, integrity testing of the physical barrier, and for active venting (i.e., connecting a vacuum pump to the piping to draw vapors out from beneath the building) if such a need arose in the future. A vapor barrier design is required to be provided to DNREC-SIRB for review and approval prior to installation.

5. Groundwater Monitoring - Prepare and implement the following:

- A Groundwater Monitoring Plan will be submitted to DNREC for review one (1) year after construction begins. The purpose of the Plan is to document and evaluate the groundwater quality and flow direction after the Justison Redevelopment Phase II has been completed. Groundwater monitoring will allow for future assessments of changes in the site conditions. This monitoring system is anticipated to be incorporated into an area wide groundwater monitoring network. The DNREC is undertaking an area wide groundwater monitoring and evaluation project to determine if any further investigation or remediation of the groundwater in the Christina Riverfront area will be required. The results of the groundwater project will be available to the public when the project is complete.

6. Institutional Controls – Perform and implement the following:

- Place an environmental covenant on the Site, consistent with Delaware's Uniform Environmental Covenants Act (UECA). This approach will address future maintenance, notice to DNREC-SIRB prior to future intrusive activities and restrictions on the use of the groundwater. In this document, identify the site as being located within the Groundwater Management Zone (GMZ), which is already in place for the City of Wilmington (August 2001). The GMZ prohibits the installation of any water wells on, or groundwater usage at the site without prior written approval of DNREC.
- Prepare and implement the DNREC-approved Redevelopment O&M Plan within ninety (90) days after the completion of final paving, streetscaping, and landscaping for the new development. The O&M Plan will detail the procedures, practices and reporting requirements, including regular inspections, and repairs when needed, to minimize the potential for disturbing the surface cover and to promote the long term integrity of the system. It will also include accessibility to appropriate health and safety documentation and details of the groundwater monitoring program. Incorporate the Site into DNREC's Long-Term Site Stewardship program as it develops.

7.0 CERTIFICATE OF COMPLETION OF REMEDY

The Justison Redevelopment Phase II consists of phases that will take several years to construct. Environmental remediation will be implemented in sequential phases, prior to, and in conjunction with, the redevelopment. For this reason, all remedial actions will be tracked and summarized in a Remedial Action Completion Report according to the new Justison Redevelopment parcel(s) and/or roads on which they are located. After the completion of the report for each parcel, the Owner will request that DNREC provide a Certificate of Completion of Remedy (COCR) for the parcel.

The COCRs will be issued according to the following parcels:

1. Parcel 6
2. Parcel 7
3. Parcel 8
4. Portion future parcel 9.
5. DelDOT-constructed Roads (Madison Street, Beech Street, Hollingsworth Avenue)

At DNREC's discretion, DNREC may assign operable unit titles and tracking numbers to each of these parcels, and issue the COCRs according to those designations.

8.0 PUBLIC PARTICIPATION

The Department is actively soliciting written public comments and suggestions on the proposed plan of remedial action. The comment period begins September 13, 2006 and ends at the close of business (4:30 p.m.) on October 3, 2006.

If you have any questions or concerns regarding the Justison Redevelopment Phase II sites, or if you would like to review the reports or other information regarding the site, please contact the Project Managers, Wilmer Reyes and/or Rick Galloway, at 391 Lukens Drive, New Castle, DE 19720 or at 302-395-2600.

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James D. Werner, Director Date
Department of Air and Waste Management

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